Fig.1

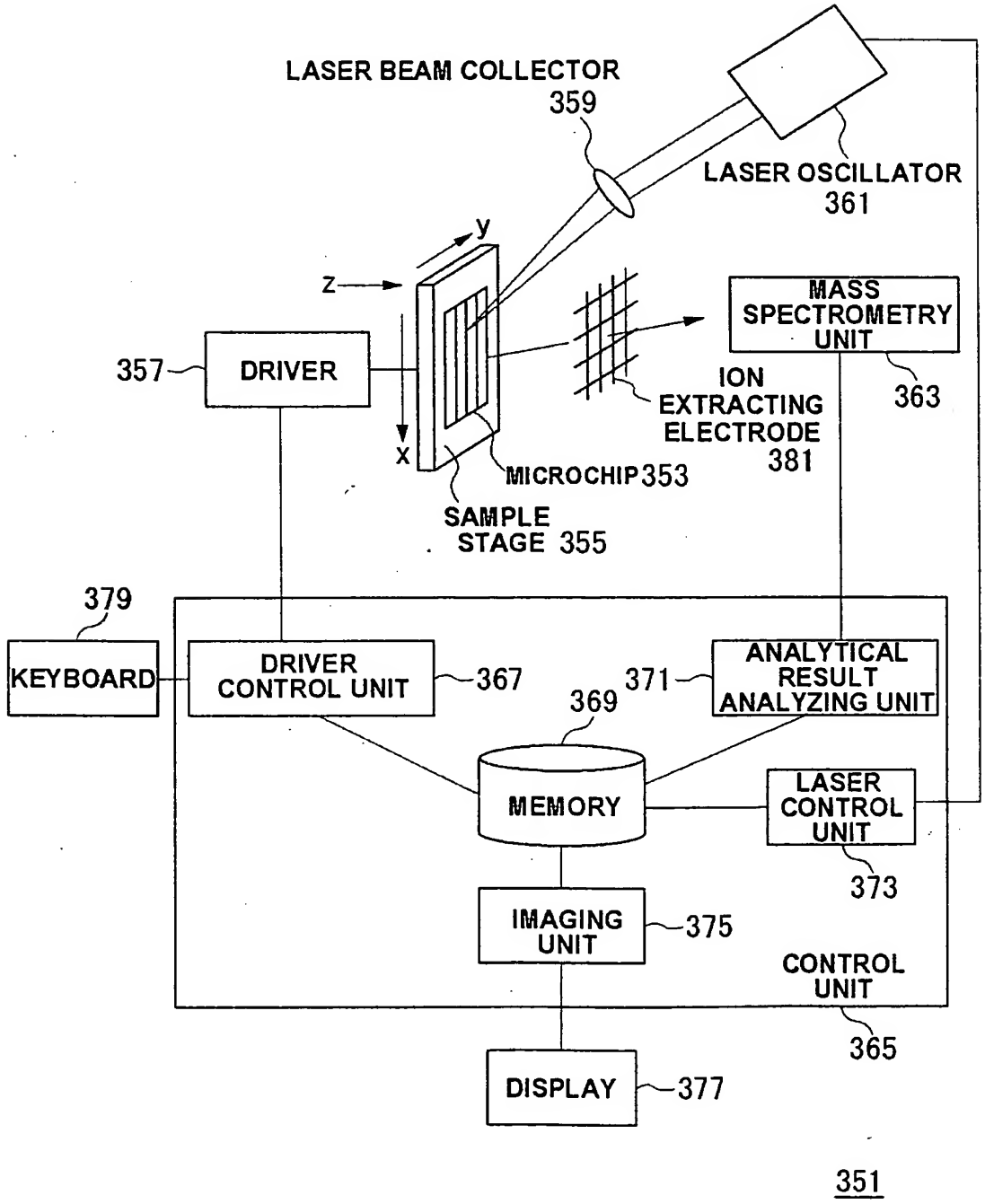

LASER BEAM COLLECTOR
359
LASER OSCILLATOR
361
y
z
x
357
DRIVER
MASS SPECTROMETRY UNIT
363
ION EXTRACTING ELECTRODE
381
MICROCHIP353
SAMPLE STAGE 355
379
KEYBOARD
DRIVER CONTROL UNIT
367
371
ANALYTICAL RESULT ANALYZING UNIT
369
MEMORY
LASER CONTROL UNIT
373
IMAGING UNIT
375
CONTROL UNIT
365
DISPLAY
377
351

Fig.2

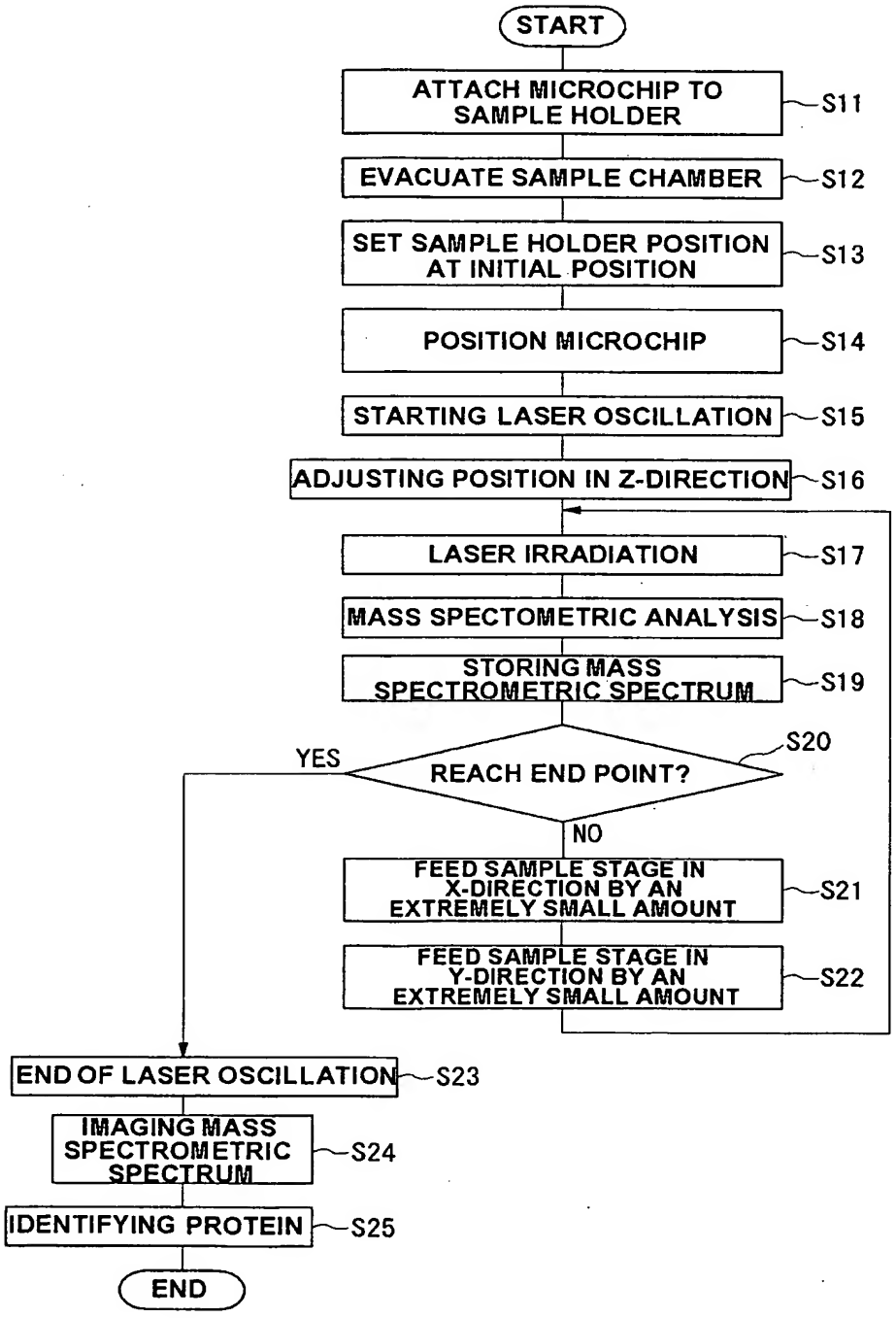

START
ATTACH MICROCHIP TO SAMPLE HOLDER
S11
EVACUATE SAMPLE CHAMBER
S12
SET SAMPLE HOLDER POSITION AT INITIAL POSITION
S13
POSITION MICROCHIP
S14
STARTING LASER OSCILLATION
S15
ADJUSTING POSITION IN Z-DIRECTION
S16
LASER IRRADIATION
S17
MASS SPECTOMETRIC ANALYSIS
S18
STORING MASS SPECTROMETRIC SPECTRUM
S19
S20
YES
REACH END POINT?
NO
FEED SAMPLE STAGE IN X-DIRECTION BY AN EXTREMELY SMALL AMOUNT
S21
FEED SAMPLE STAGE IN Y-DIRECTION BY AN EXTREMELY SMALL AMOUNT
S22
END OF LASER OSCILLATION
S23
IMAGING MASS SPECTROMETRIC SPECTRUM
S24
IDENTIFYING PROTEIN
S25
END

Fig.3

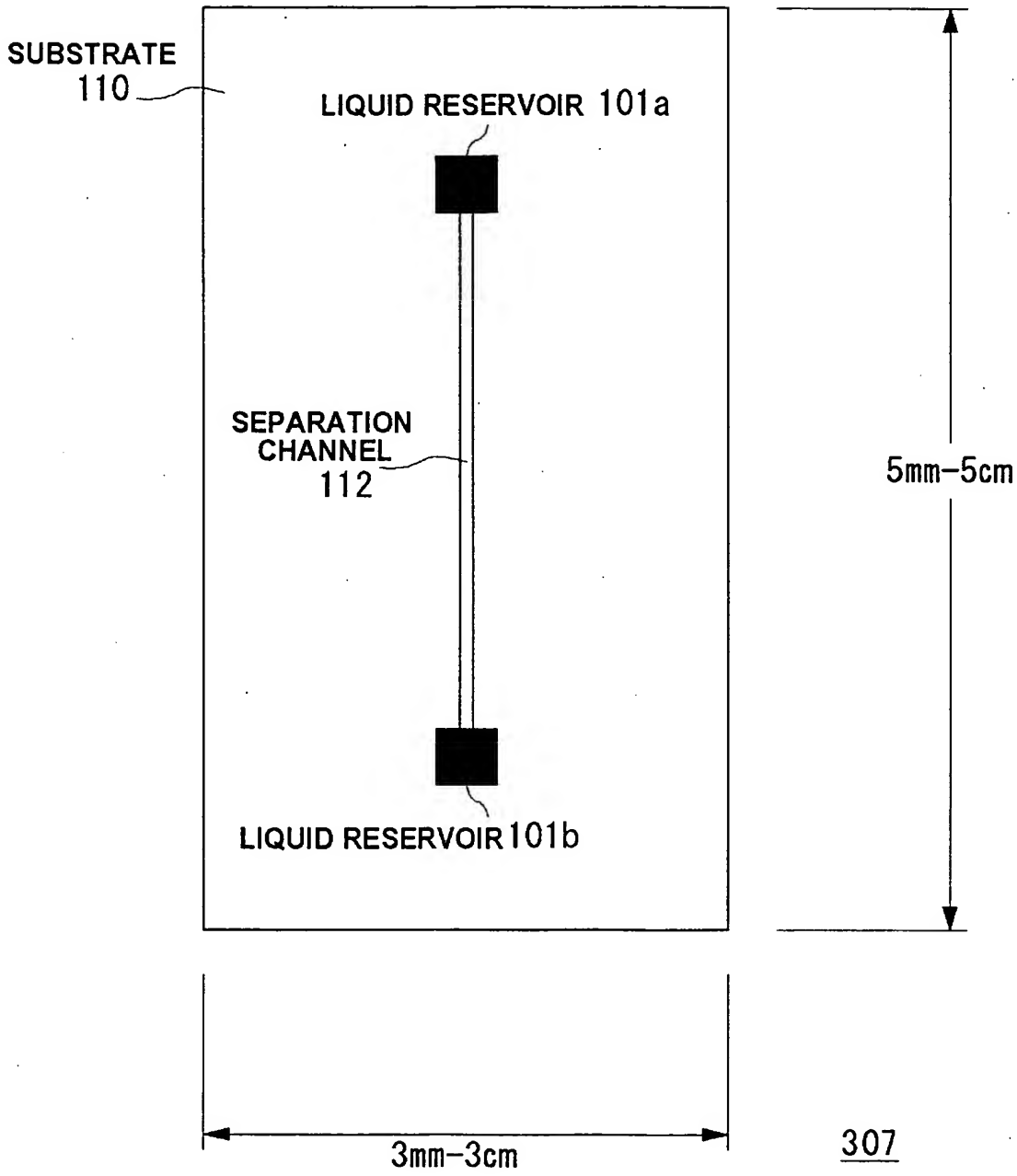

SUBSTRATE
110
LIQUID RESERVOIR 101a
SEPARATION
CHANNEL
112
LIQUID RESERVOIR 101b
5mm-5cm
3mm-3cm
307

Fig.4

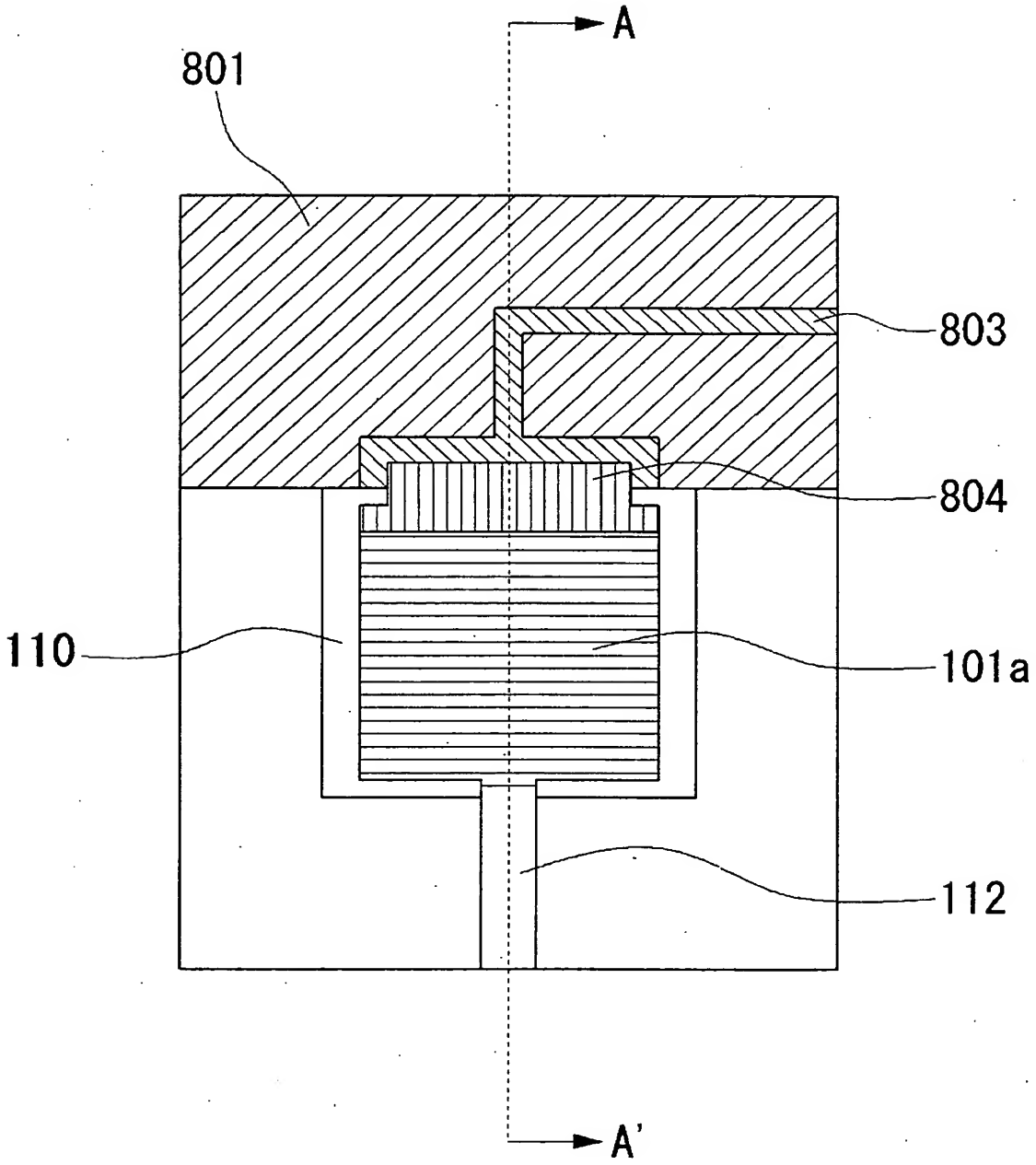


Fig.5

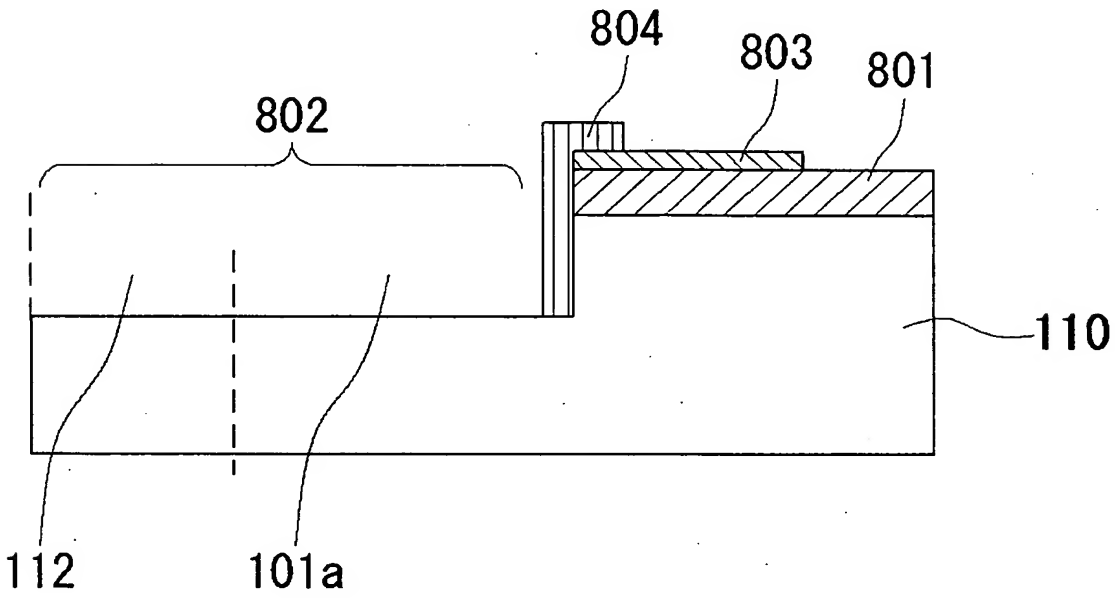
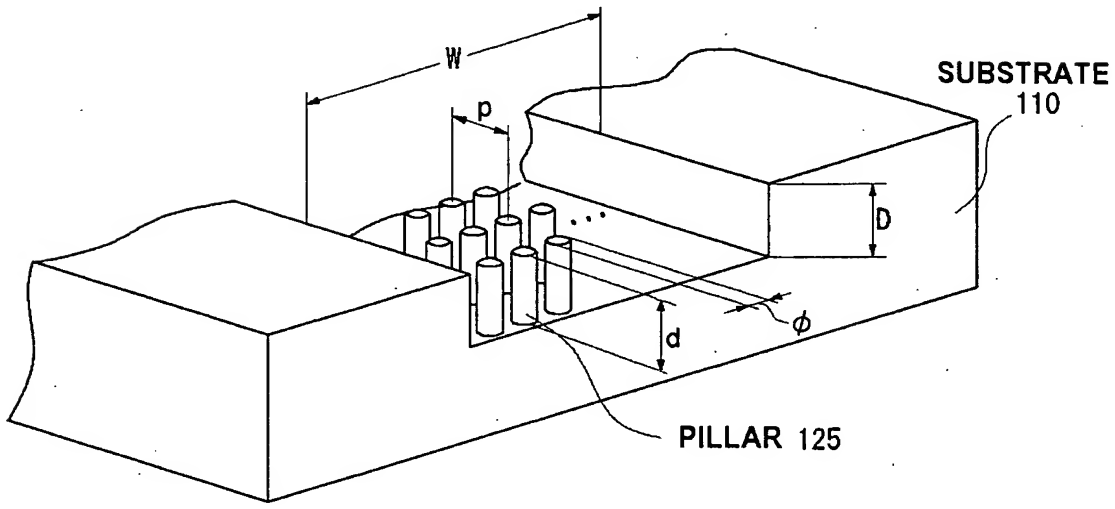


Fig.6



W	10 ～2000 μm
D	50nm ～ 3 μm
ϕ	10 ～100nm
d	10nm ～ 3 μm
p	1nm ～10 μm

Fig.7

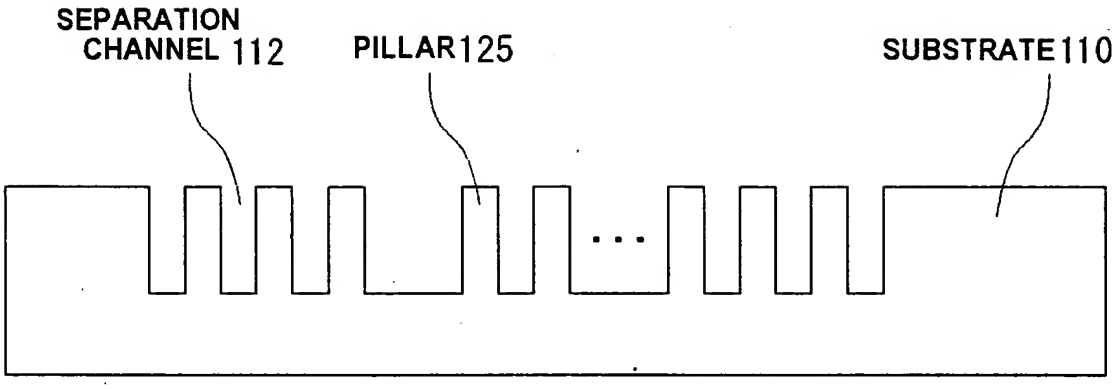


Fig.8

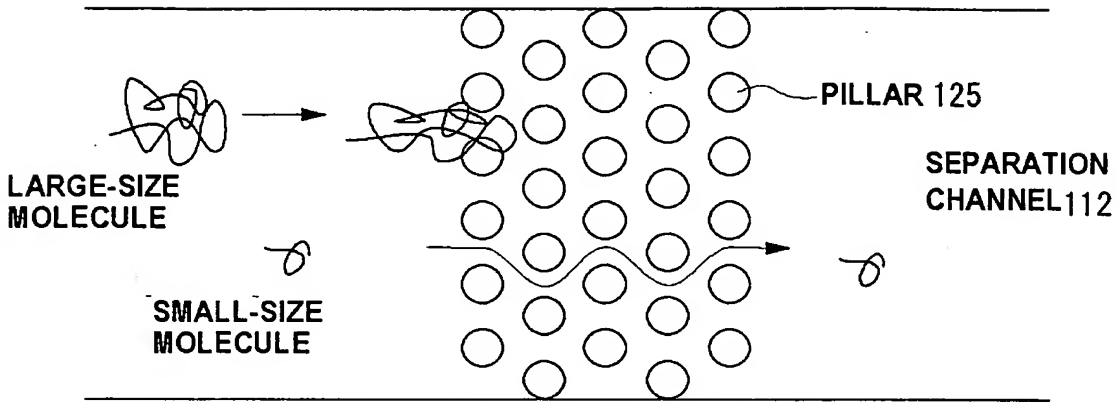

PILLAR 125
SEPARATION CHANNEL112
LARGE-SIZE MOLECULE
SMALL-SIZE MOLECULE

Fig.9

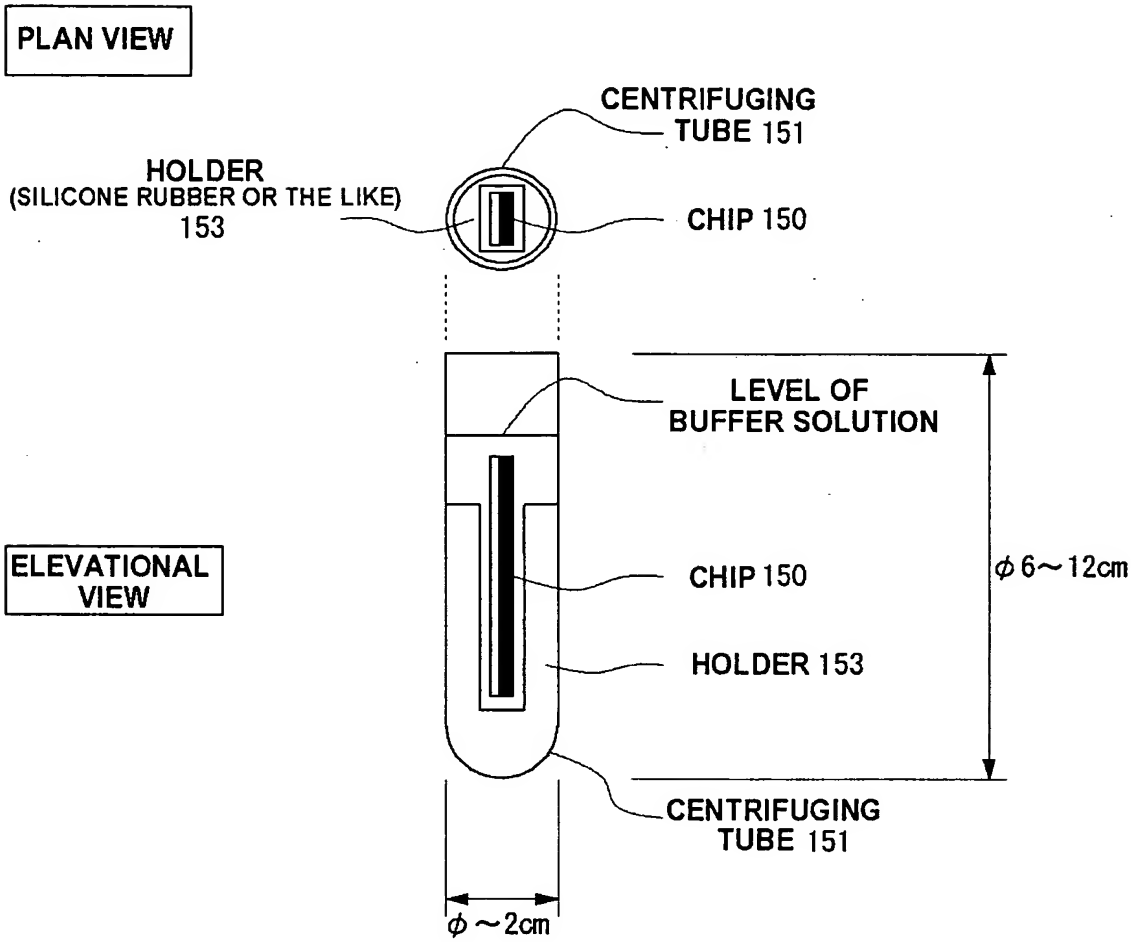

PLAN VIEW
CENTRIFUGING TUBE 151
HOLDER (SILICONE RUBBER OR THE LIKE) 153
CHIP 150
LEVEL OF BUFFER SOLUTION
ELEVATIONAL VIEW
CHIP 150
HOLDER 153
φ6～12cm
CENTRIFUGING TUBE 151
φ～2cm

Fig.10

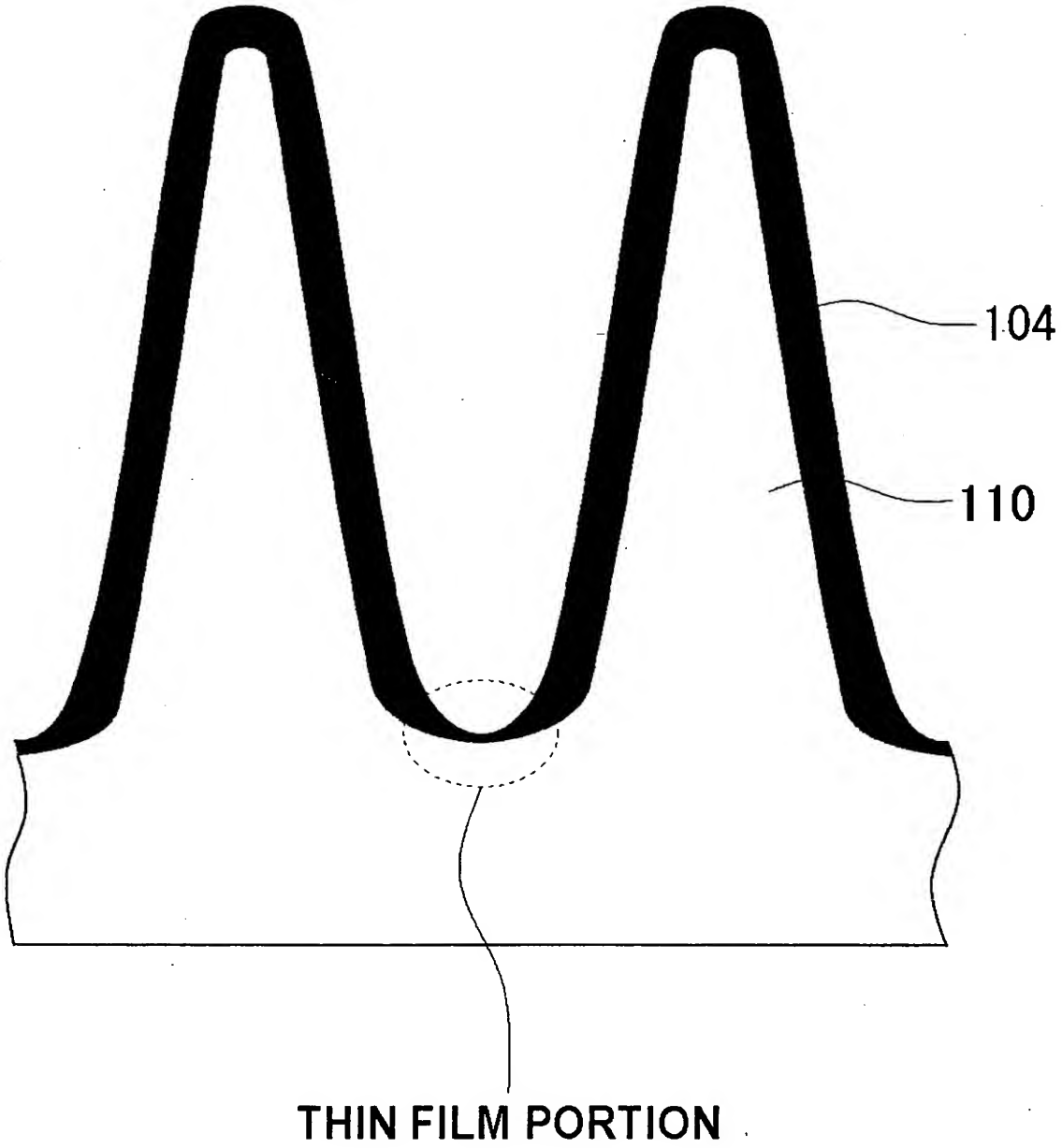


Fig.11

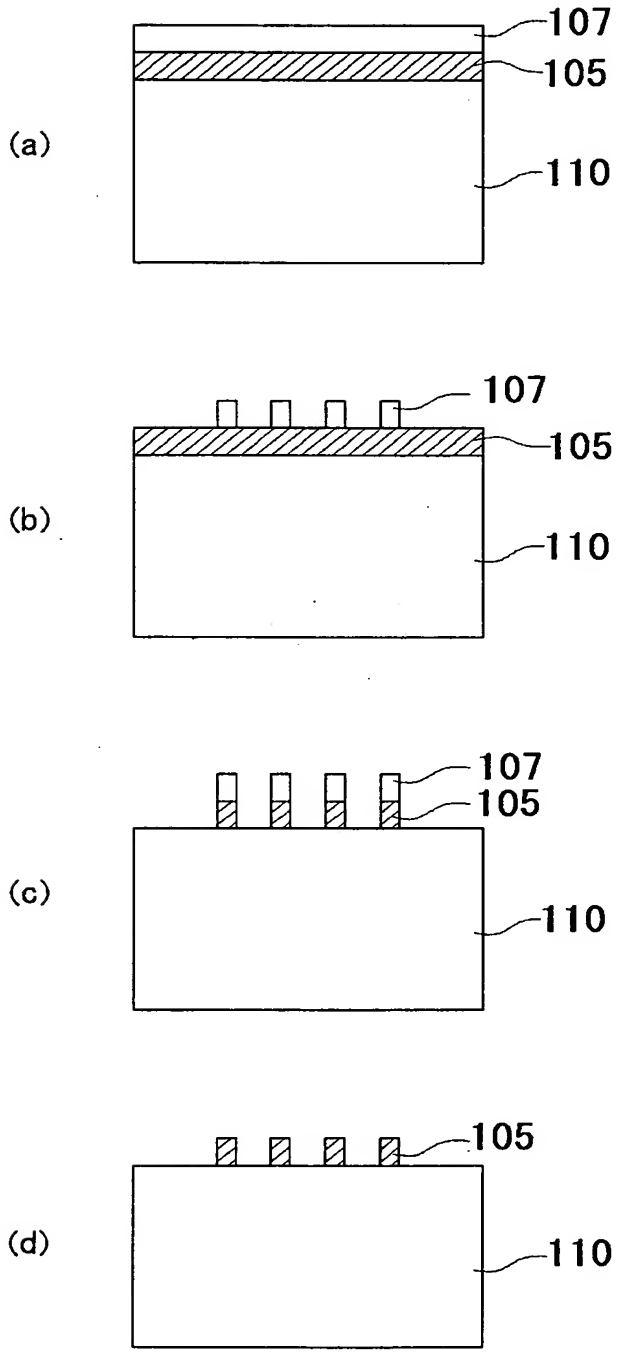
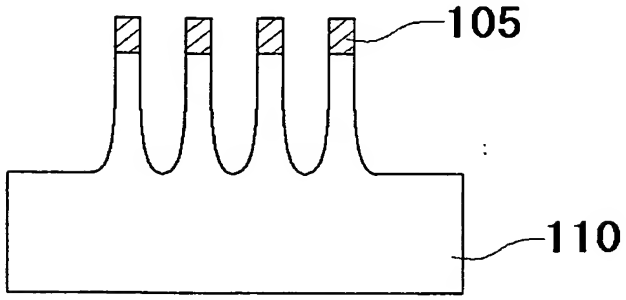
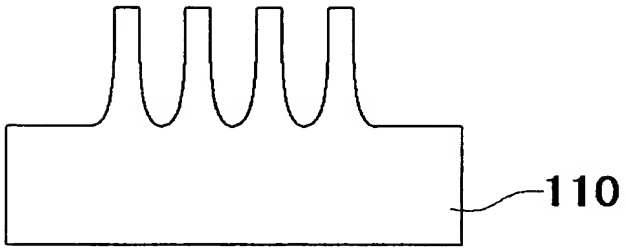


Fig.12

(e)



(f)



(g)

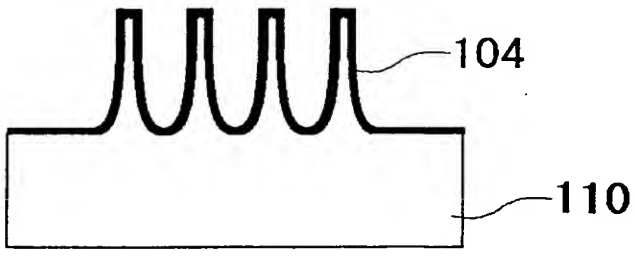
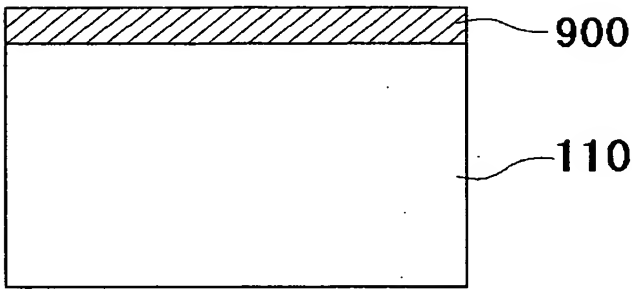
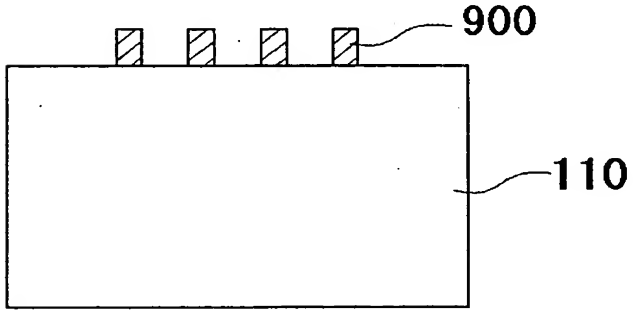


Fig.13

(a)



(b)



(c)

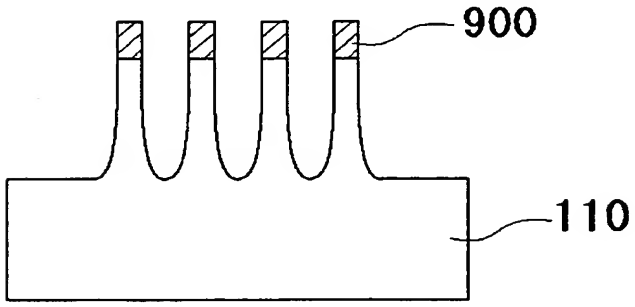


Fig.14

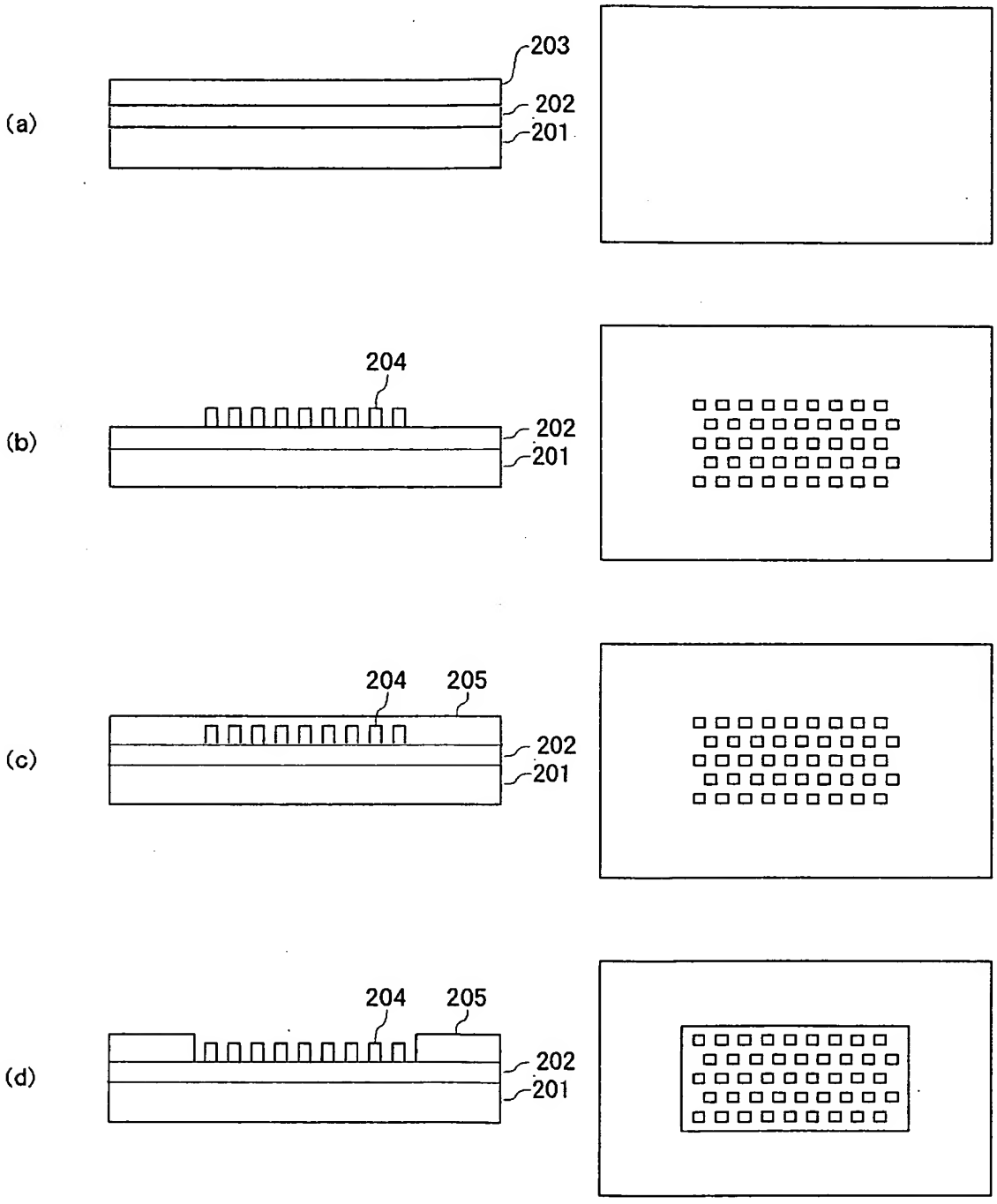


Fig.15

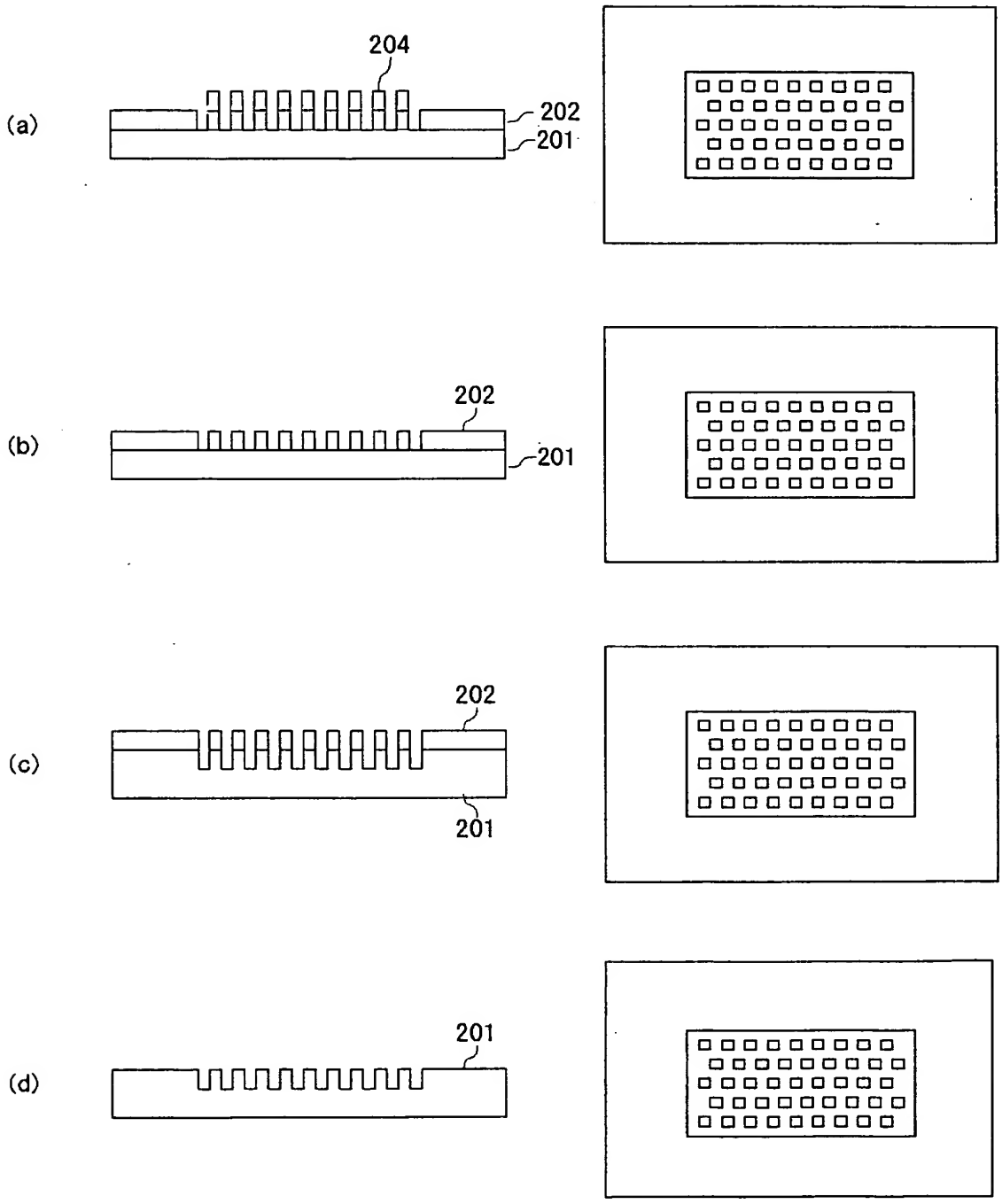


Fig.16

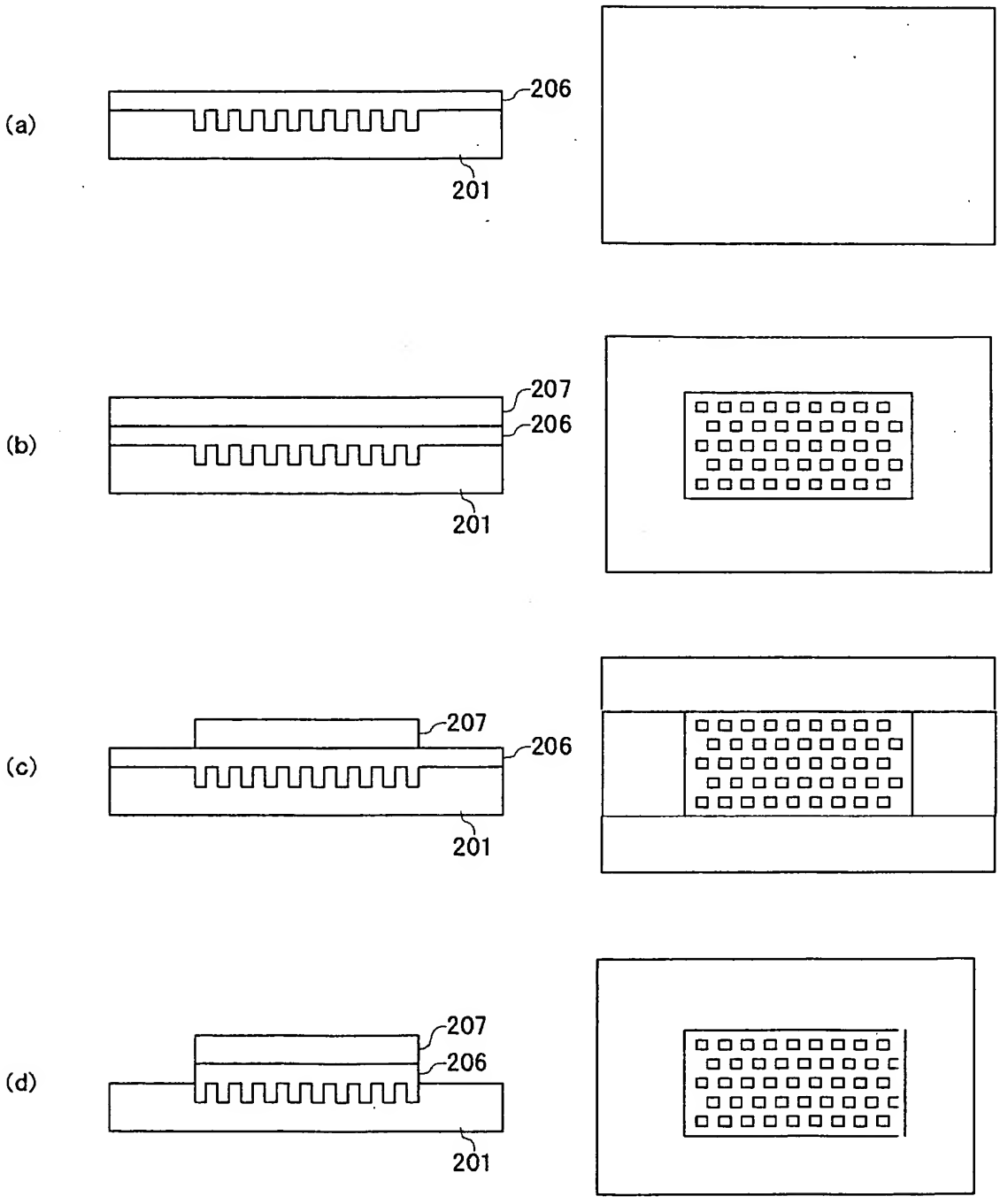


Fig.17

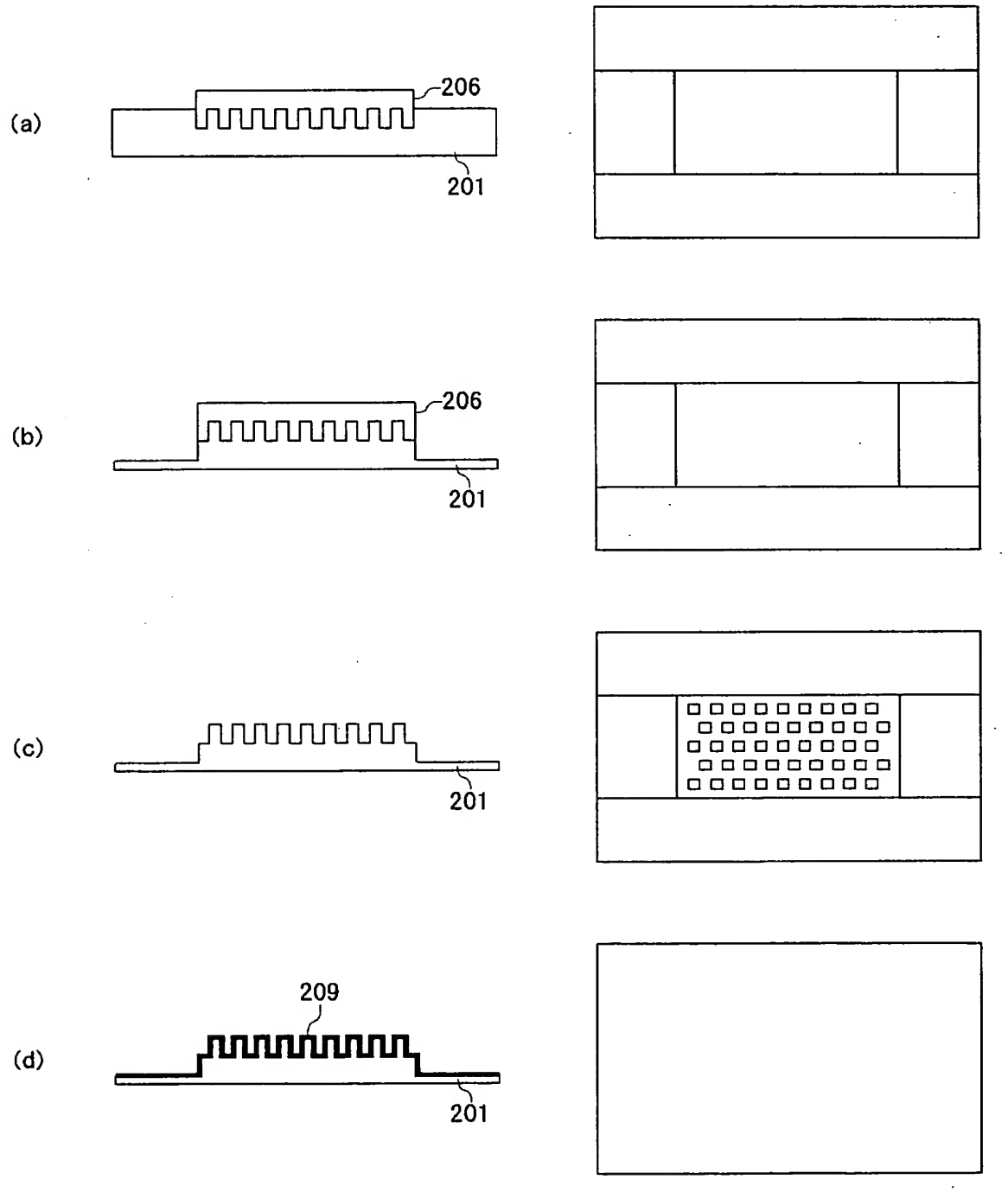
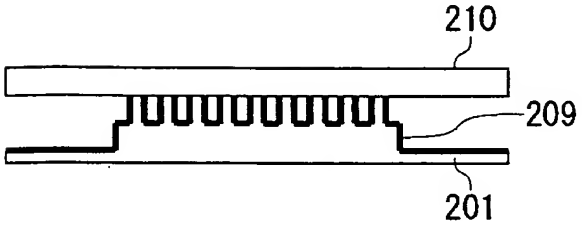


Fig.18



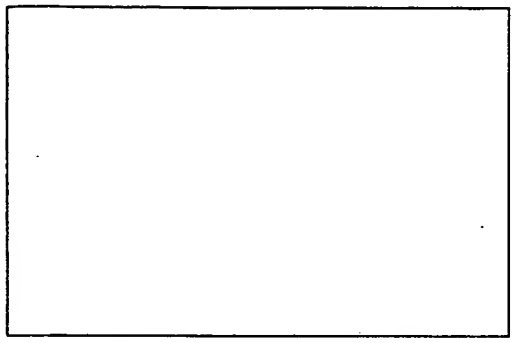


Fig.19

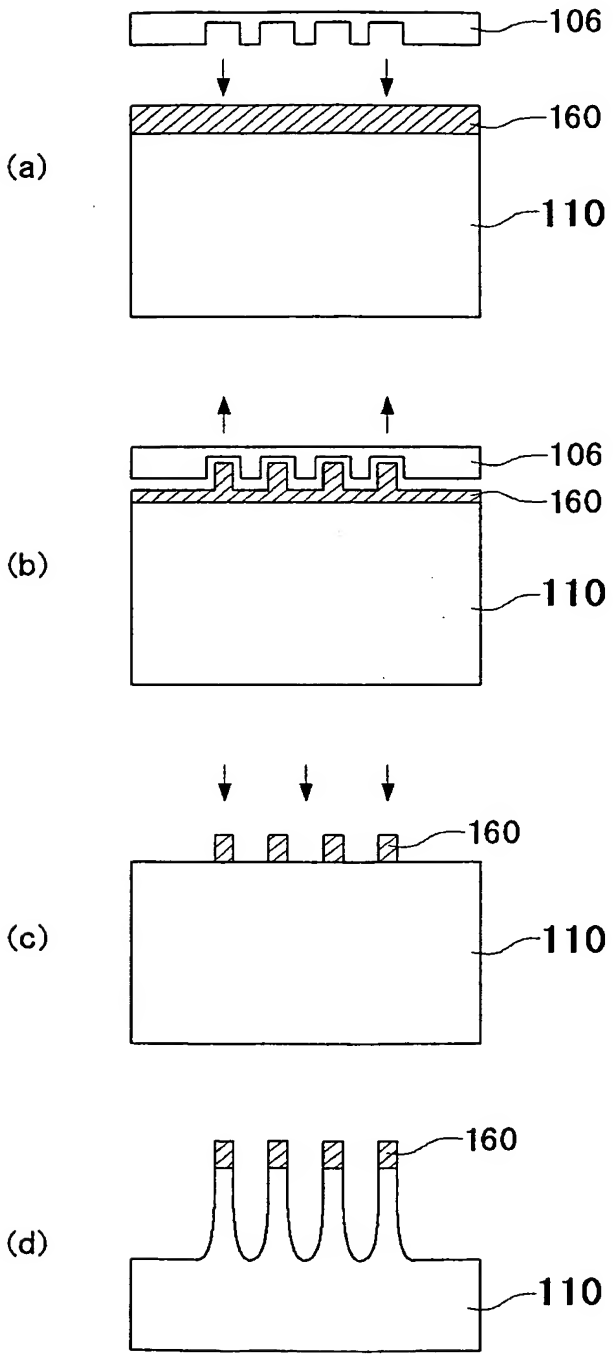
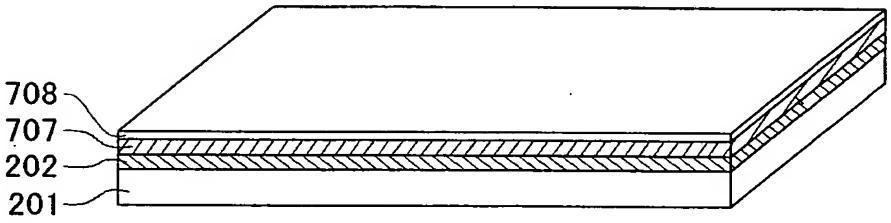
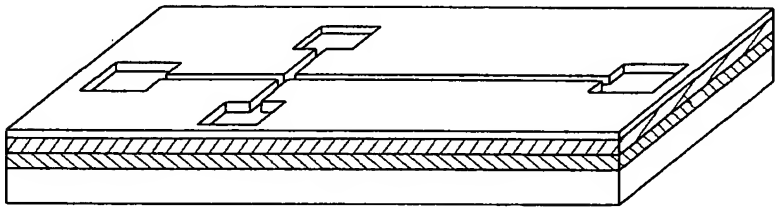


Fig.20

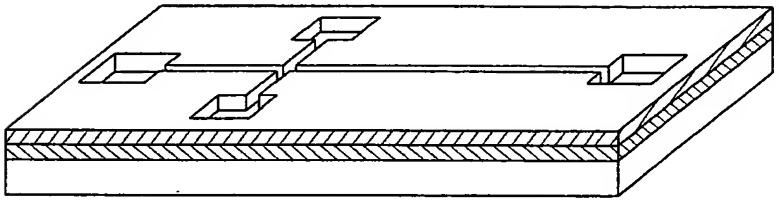
(a)



(b)



(c)



(d)

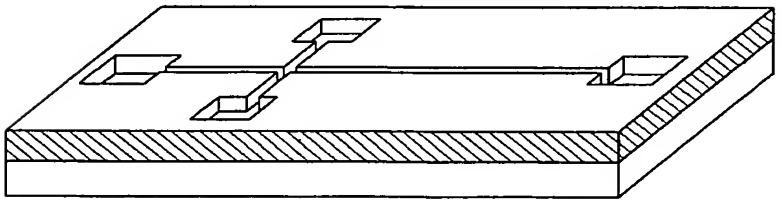


Fig.21

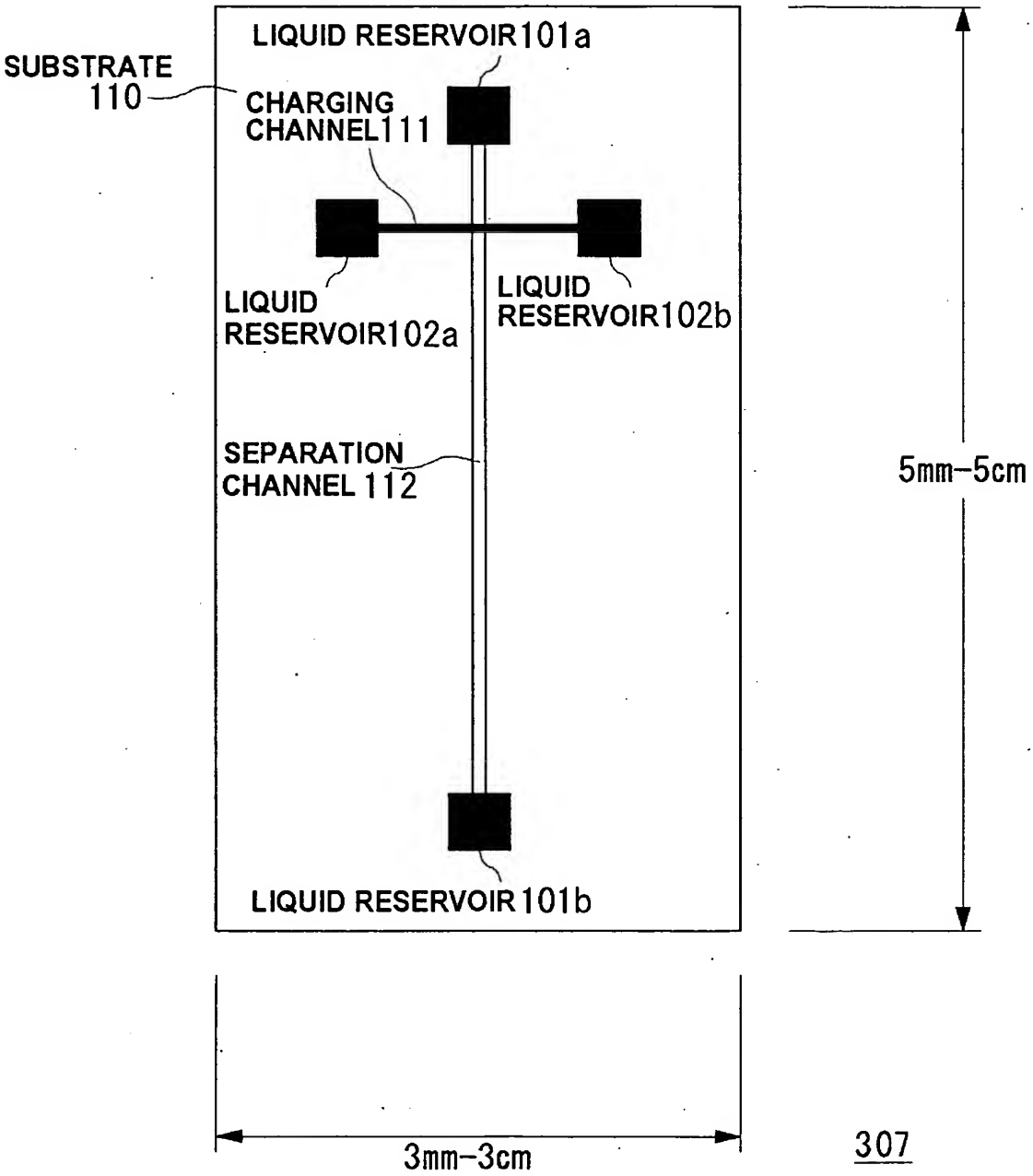

LIQUID RESERVOIR101a
SUBSTRATE
110
CHARGING
CHANNEL111
LIQUID
RESERVOIR102a
LIQUID
RESERVOIR102b
SEPARATION
CHANNEL 112
LIQUID RESERVOIR101b
5mm-5cm
3mm-3cm
307

Fig.22

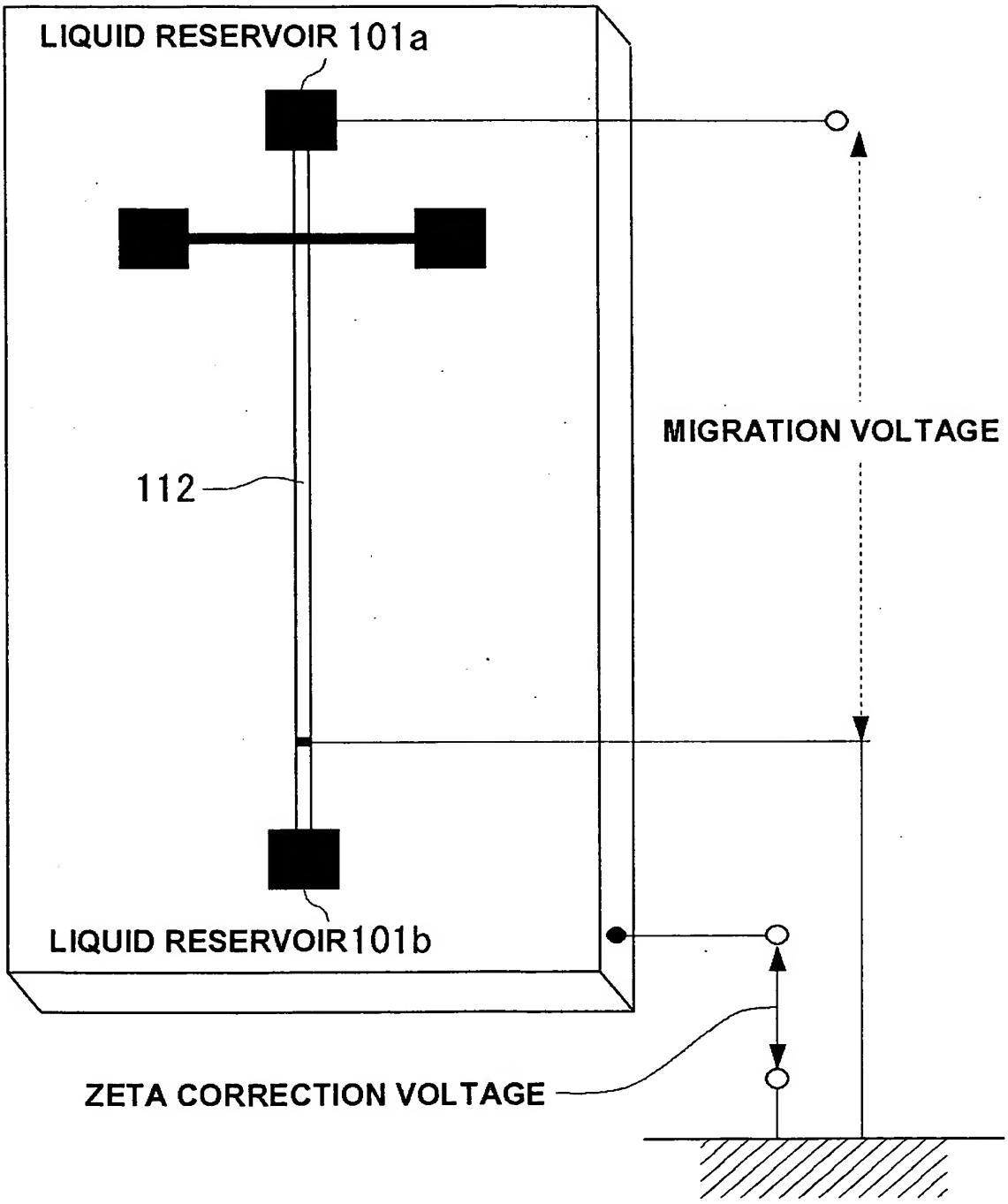

LIQUID RESERVOIR 101a
112
MIGRATION VOLTAGE
LIQUID RESERVOIR101b
ZETA CORRECTION VOLTAGE

Fig.23

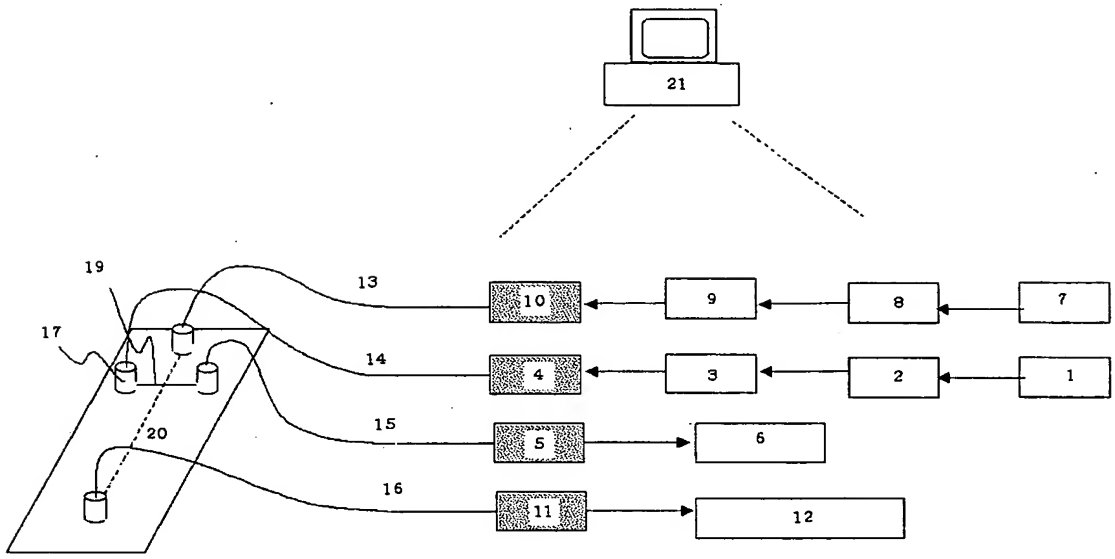


Fig.24

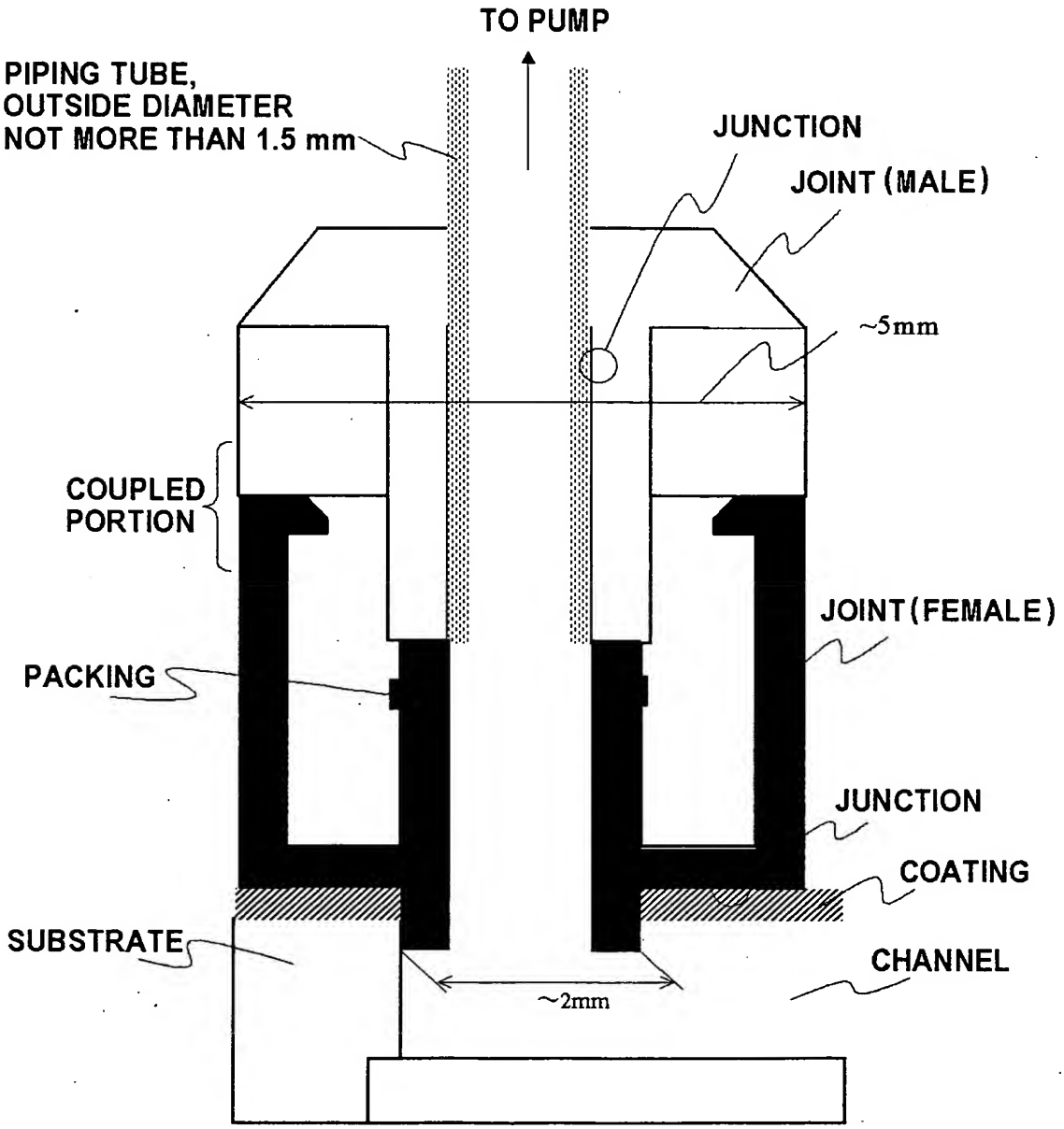

TO PUMP
PIPING TUBE,
OUTSIDE DIAMETER
NOT MORE THAN 1.5 mm
JUNCTION
JOINT (MALE)
~5mm
COUPLED
PORTION
JOINT (FEMALE)
PACKING
JUNCTION
COATING
SUBSTRATE
CHANNEL
~2mm

Fig.25

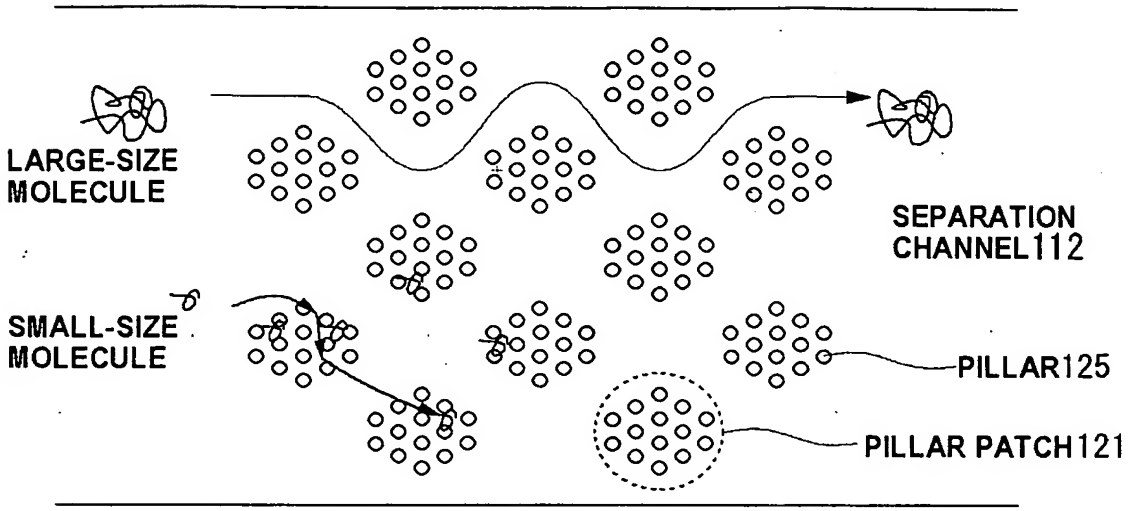
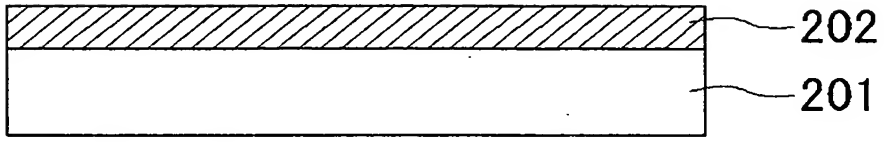
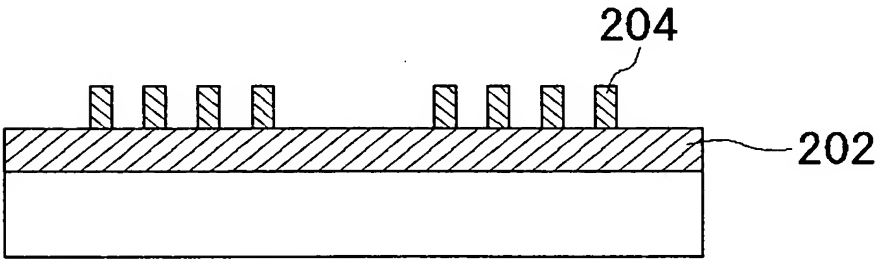

LARGE-SIZE MOLECULE
SMALL-SIZE MOLECULE
SEPARATION CHANNEL112
PILLAR125
PILLAR PATCH121

Fig.26

(a)



(b)



(c)

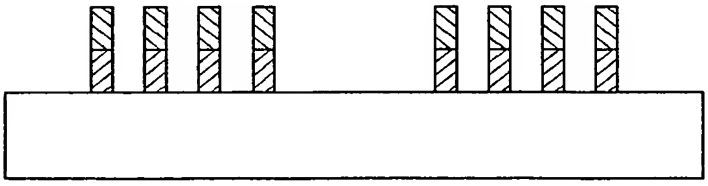
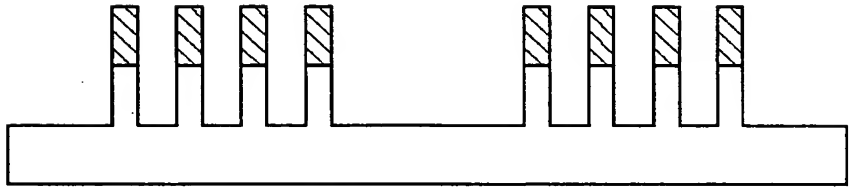


Fig.27

(d)



(e)

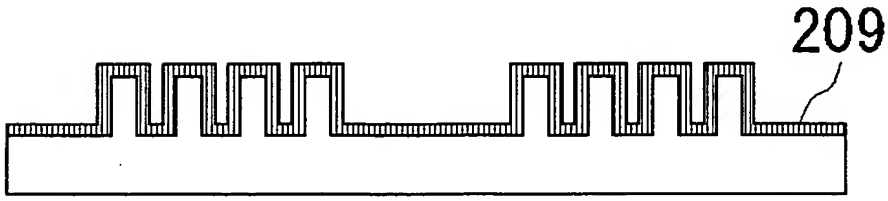
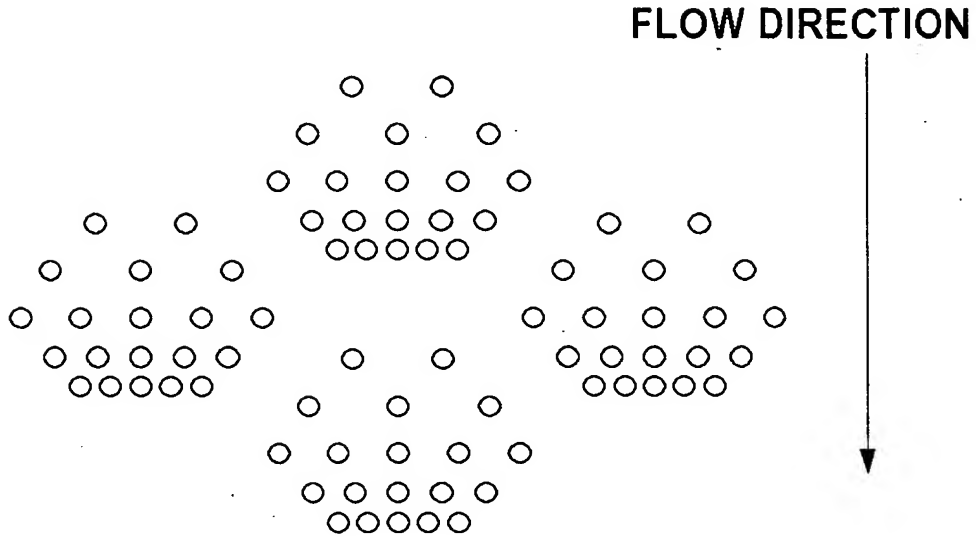


Fig.28

(a)



(b)

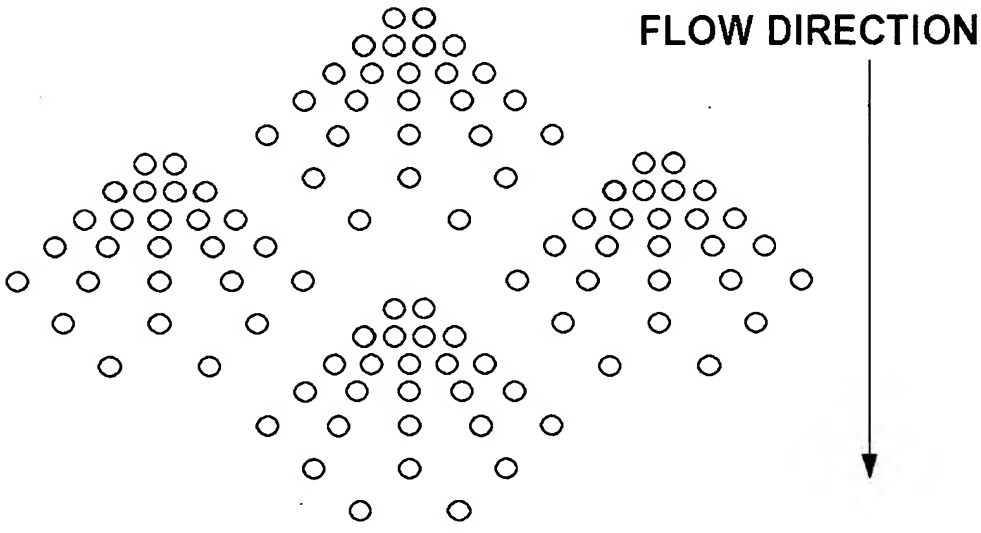


Fig.29

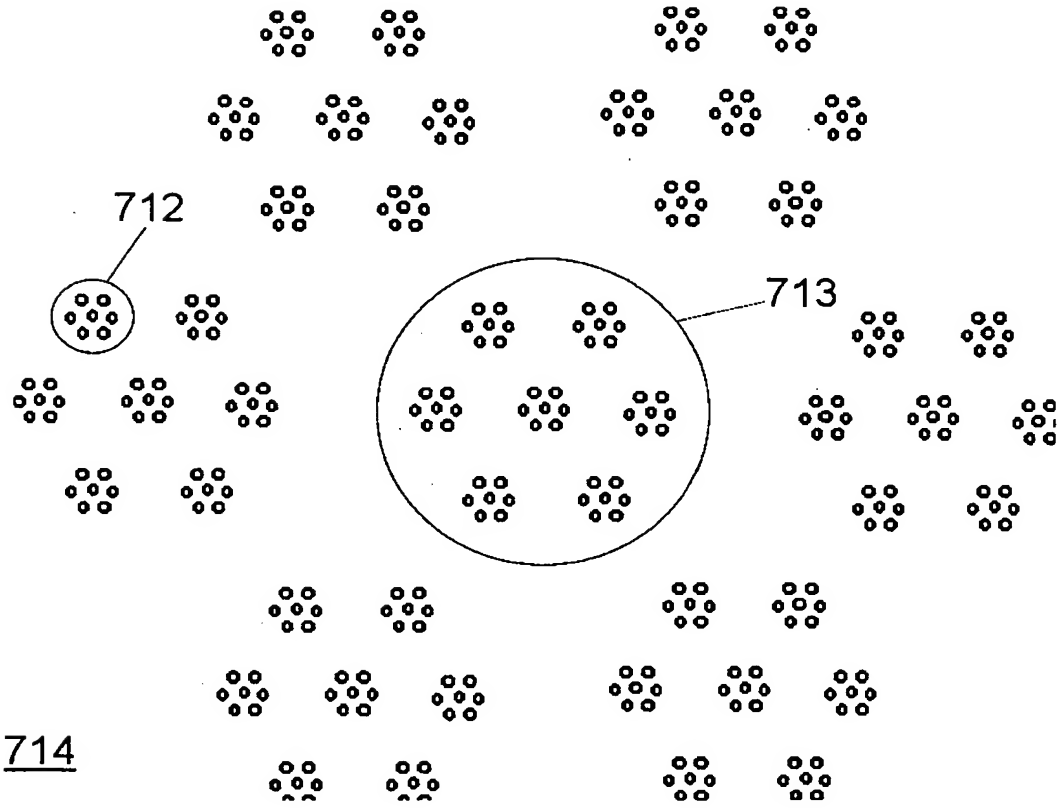


Fig.30

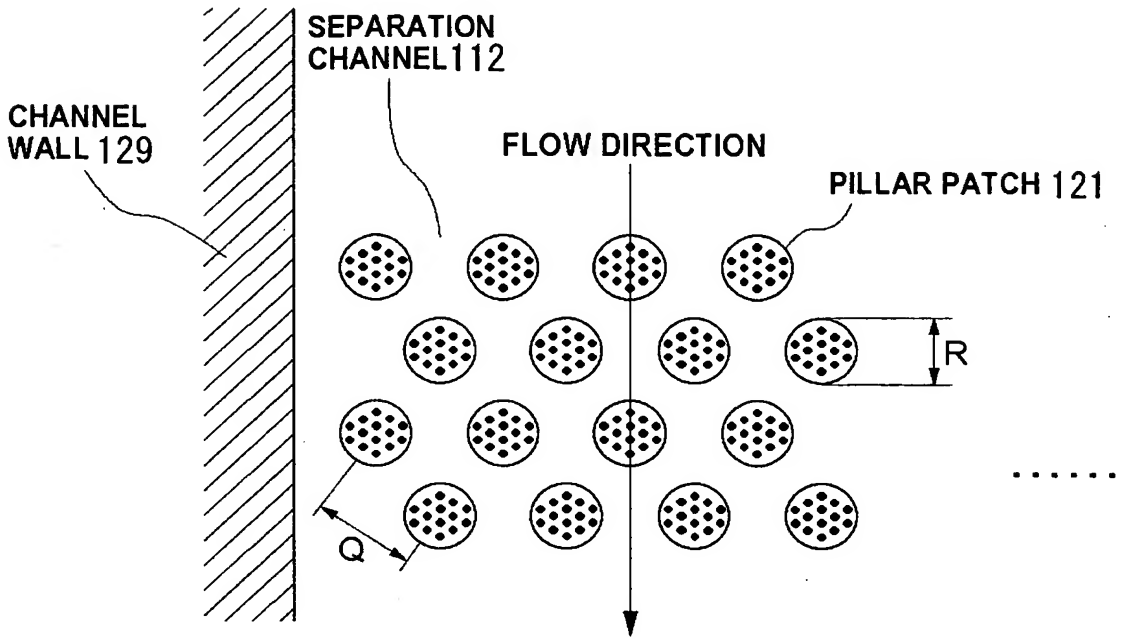


Fig.31

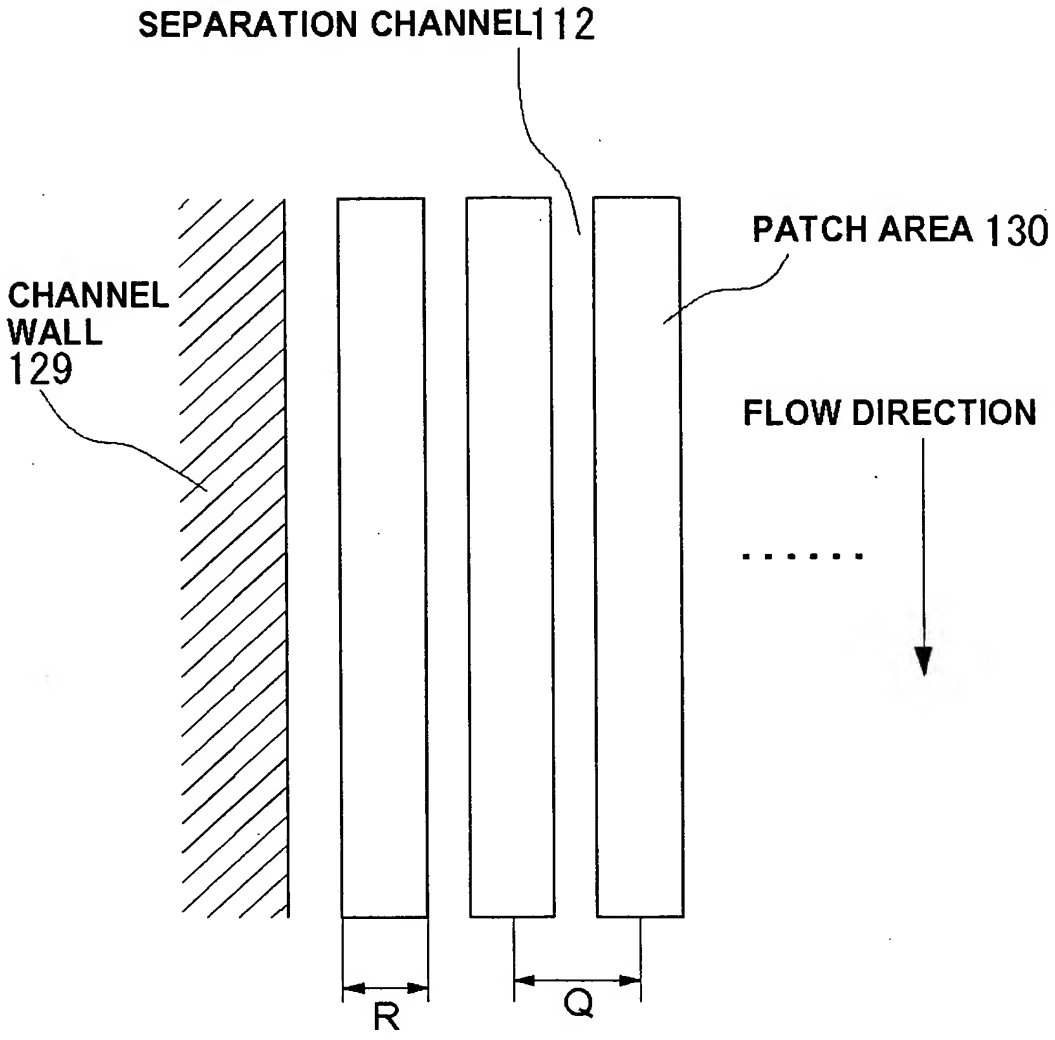

SEPARATION CHANNEL112
PATCH AREA 130
CHANNEL WALL 129
FLOW DIRECTION
R
Q

Fig.32

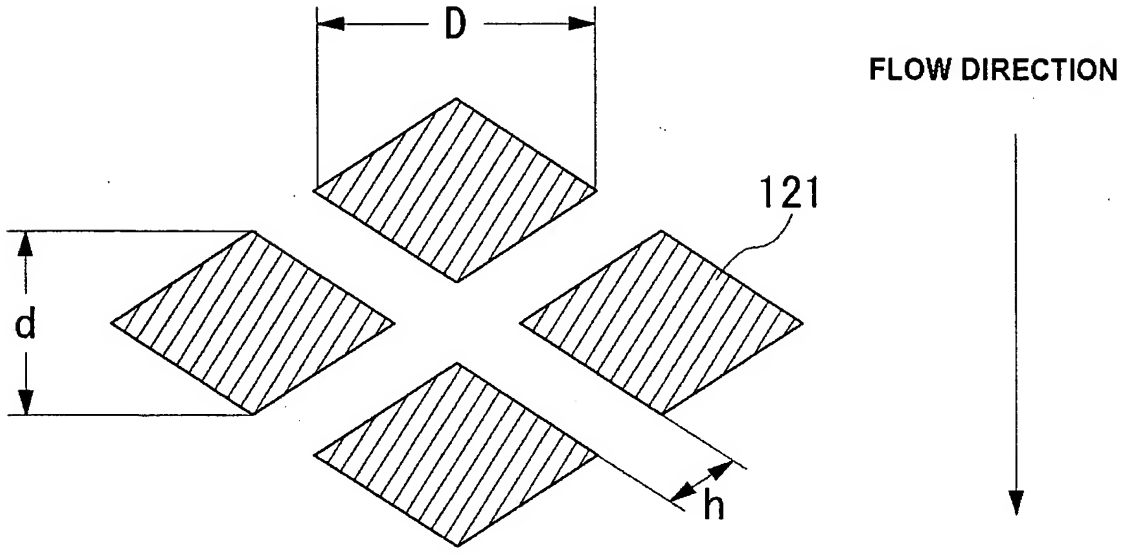
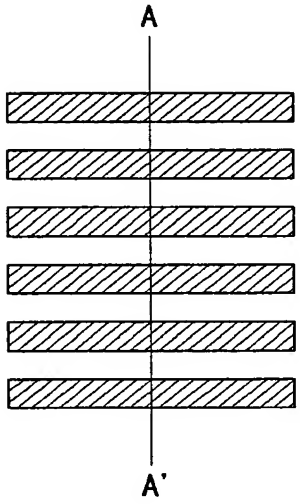
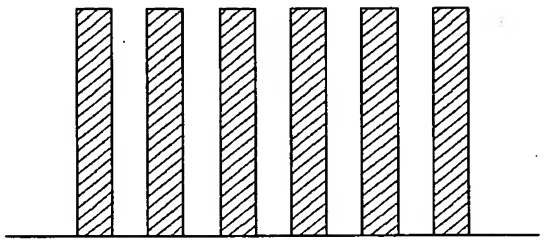


Fig.33

(a)



(b)



(c)

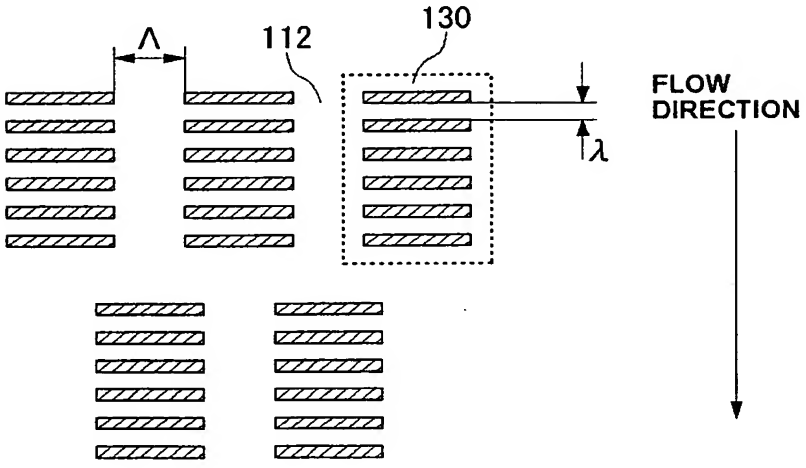
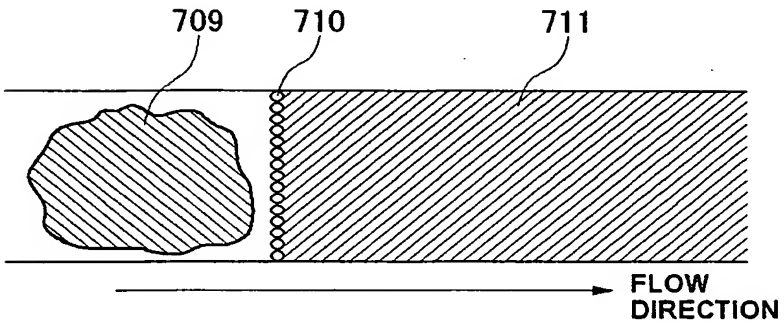
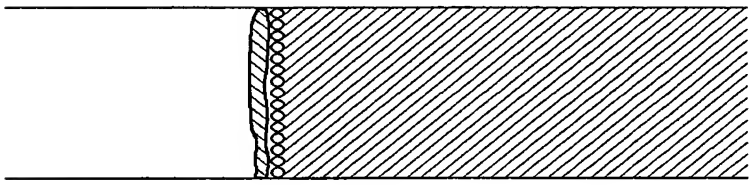


Fig.34

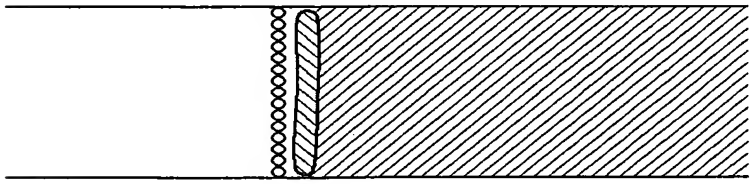
(a)



(b)



(c)



(d)

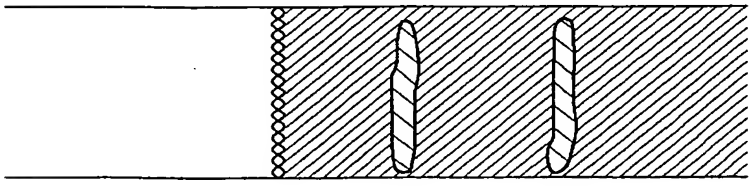


Fig.35

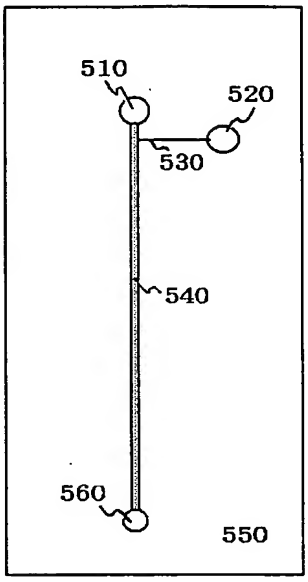


Fig.36

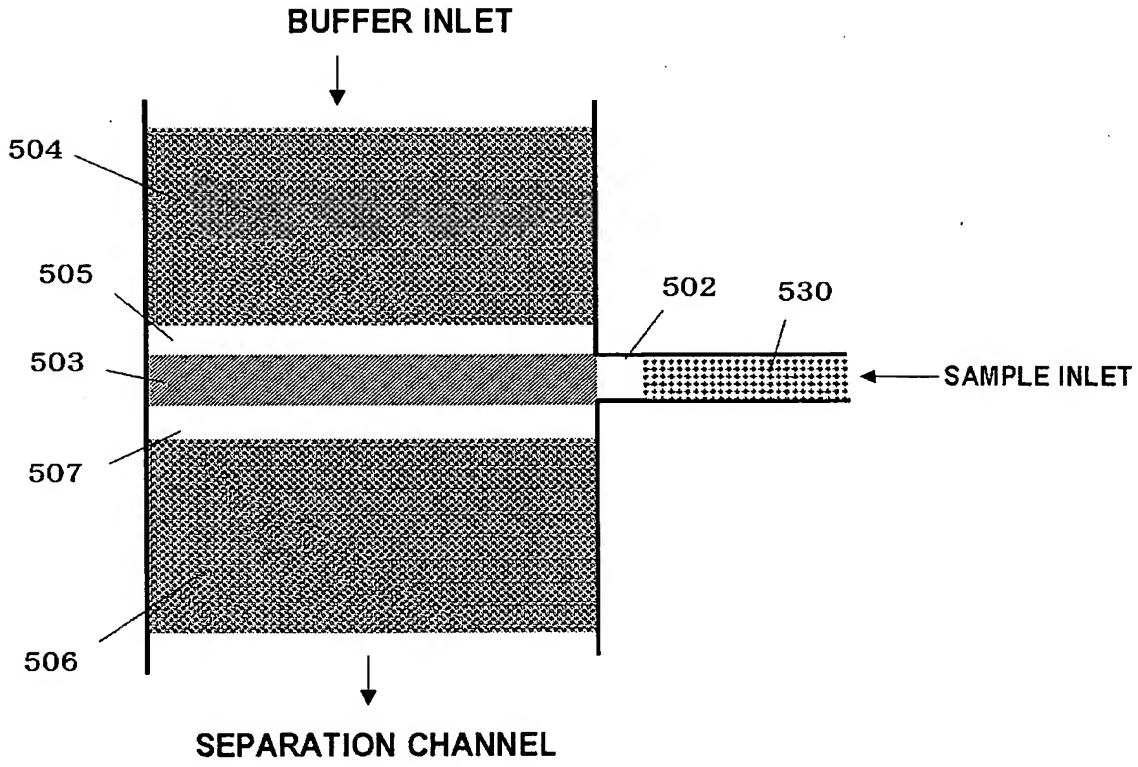


Fig.37

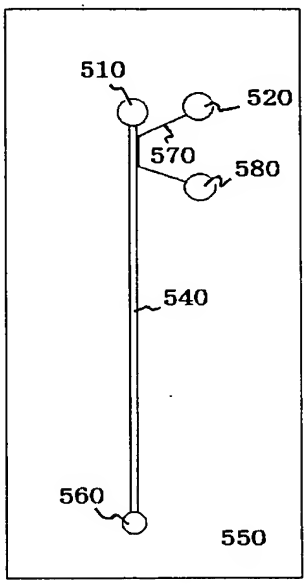


Fig.38

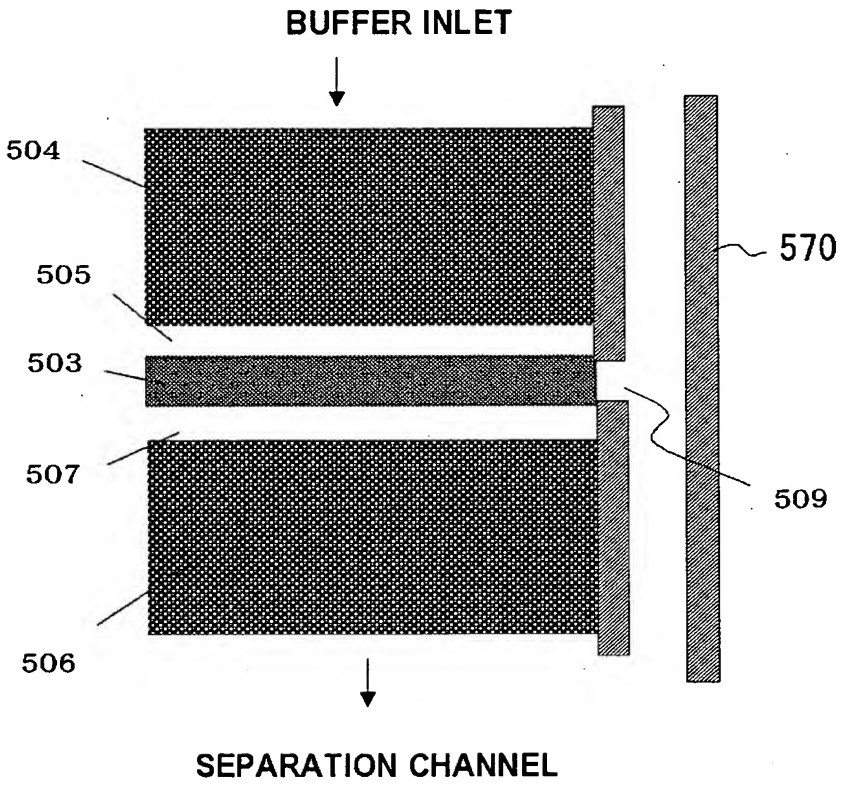


Fig.39

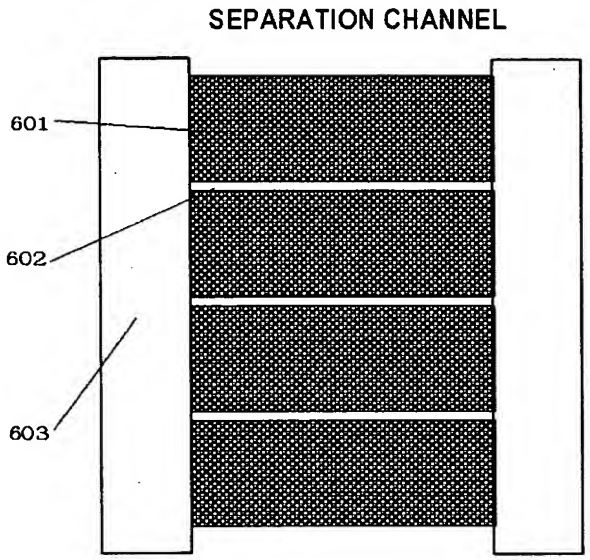


Fig.40

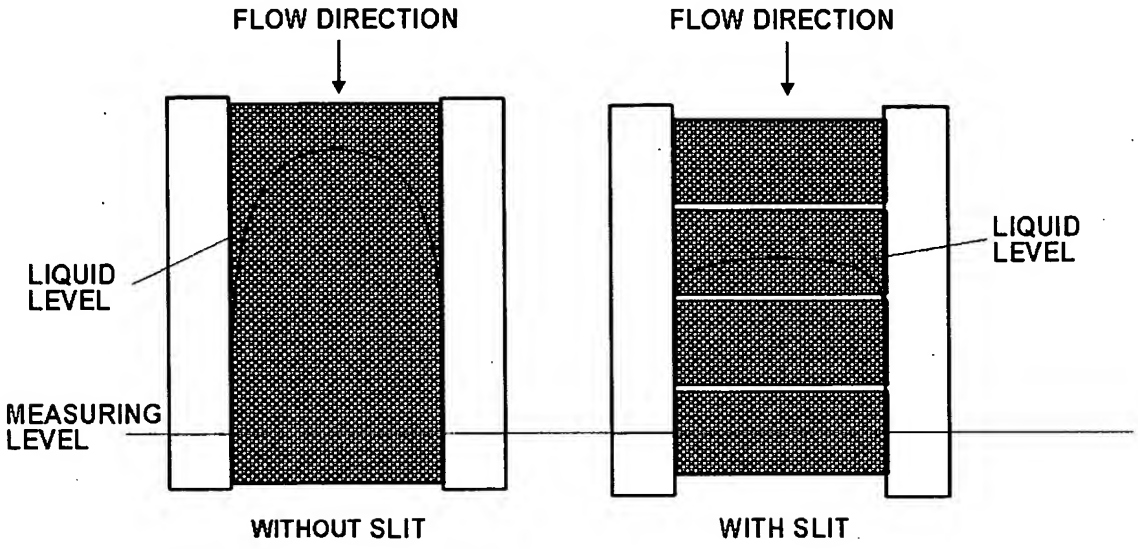

FLOW DIRECTION
FLOW DIRECTION
LIQUID LEVEL
LIQUID LEVEL
MEASURING LEVEL
WITHOUT SLIT
WITH SLIT

Fig.41

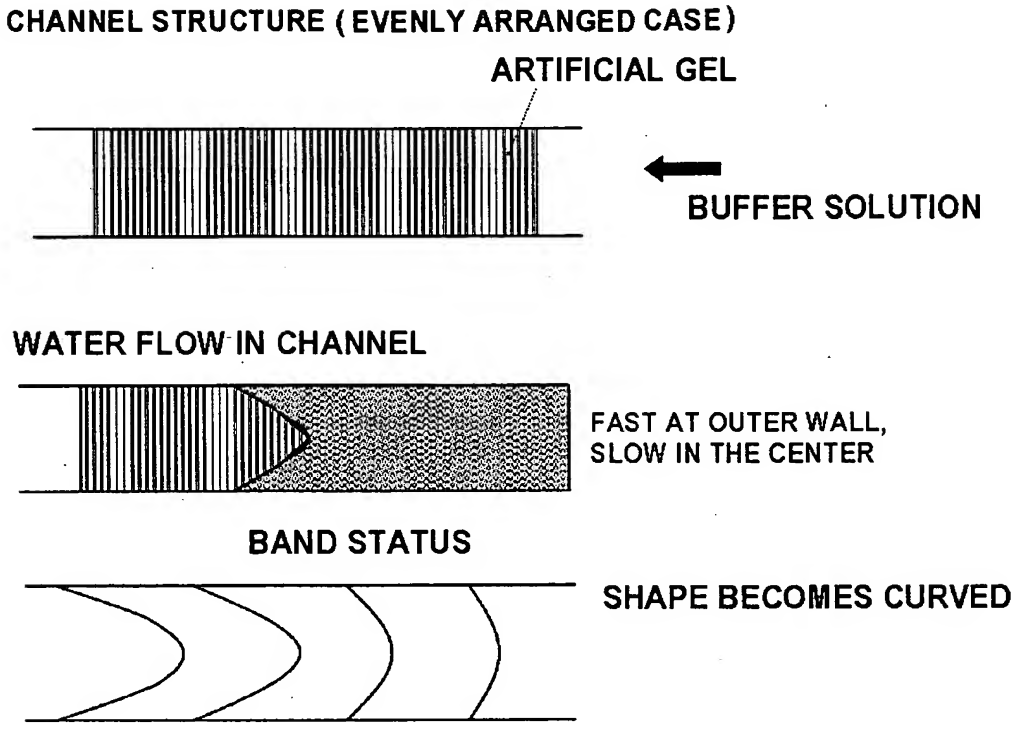


Fig.42

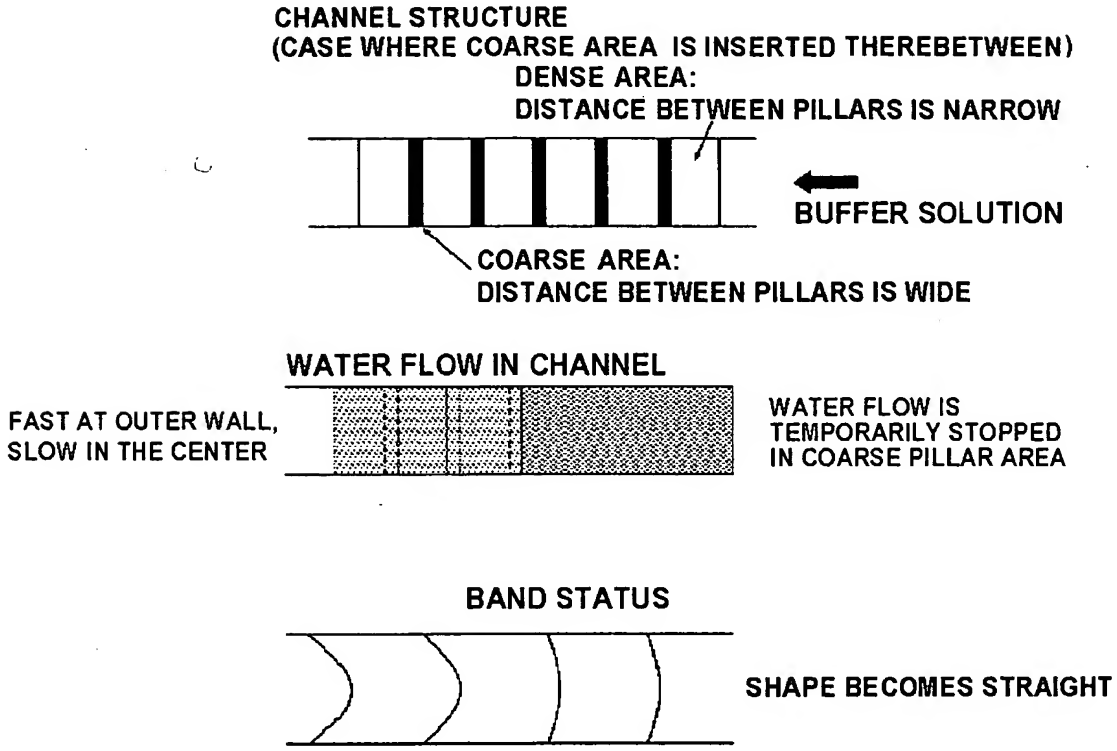
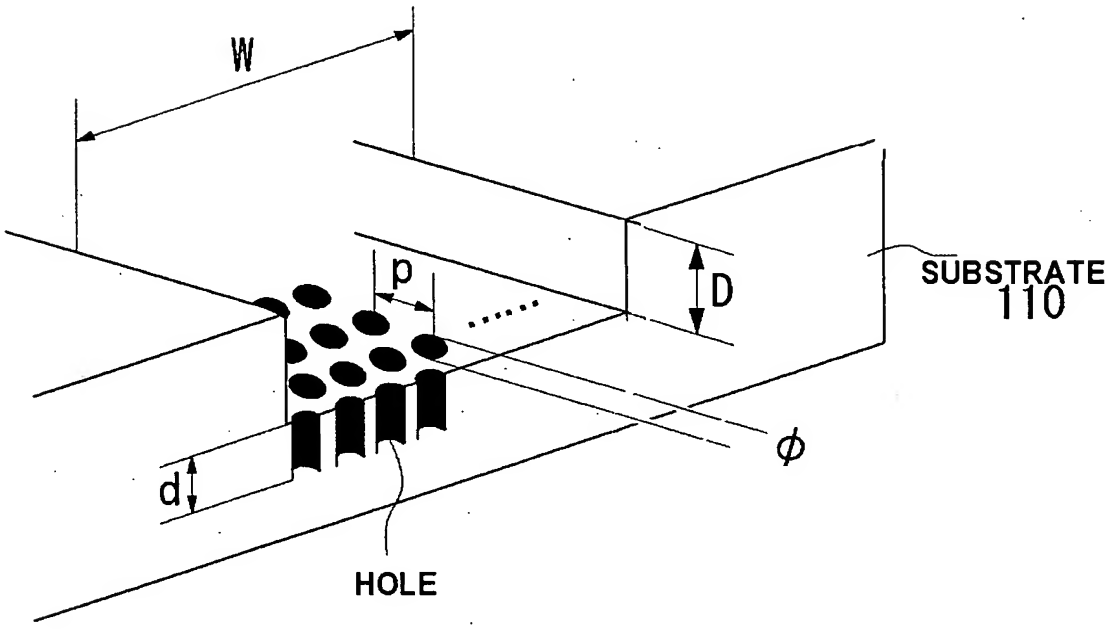

CHANNEL STRUCTURE
(CASE WHERE COARSE AREA IS INSERTED THEREBETWEEN)
DENSE AREA:
DISTANCE BETWEEN PILLARS IS NARROW
BUFFER SOLUTION
COARSE AREA:
DISTANCE BETWEEN PILLARS IS WIDE
WATER FLOW IN CHANNEL
FAST AT OUTER WALL,
SLOW IN THE CENTER
WATER FLOW IS
TEMPORARILY STOPPED
IN COARSE PILLAR AREA
BAND STATUS
SHAPE BECOMES STRAIGHT

Fig.43



	IN THE CASE OF SMALL-SIZE PARTICLE	IN THE CASE OF LARGE-SIZE PARTICLE
W	10 ~ 2000 μm	
D	100nm OR LESS	3 μm OR LESS
ϕ	50nm OR LESS	300nm OR LESS
d	100nm OR LESS	3 μm OR LESS
p	50nm OR LESS	300nm OR LESS

Fig.44

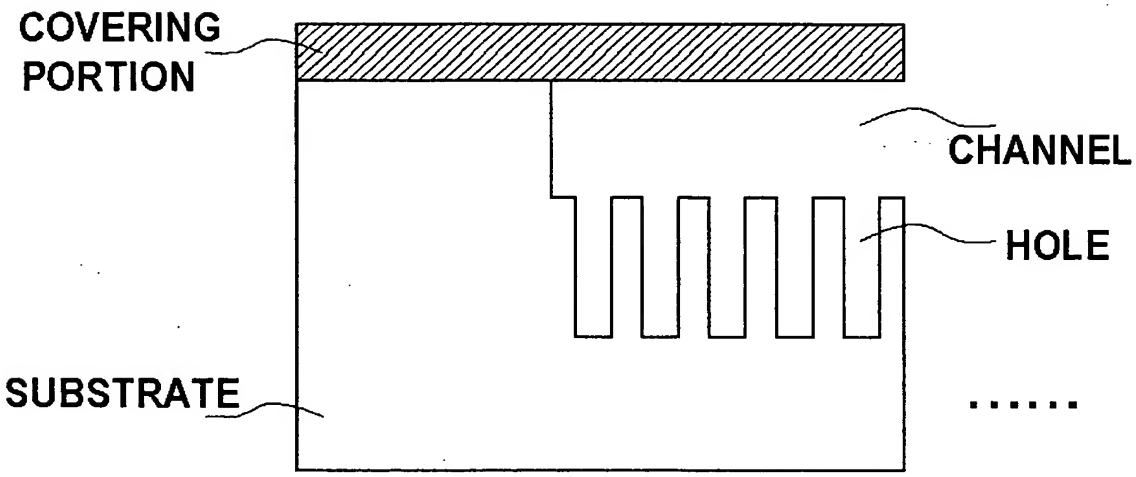


Fig.45

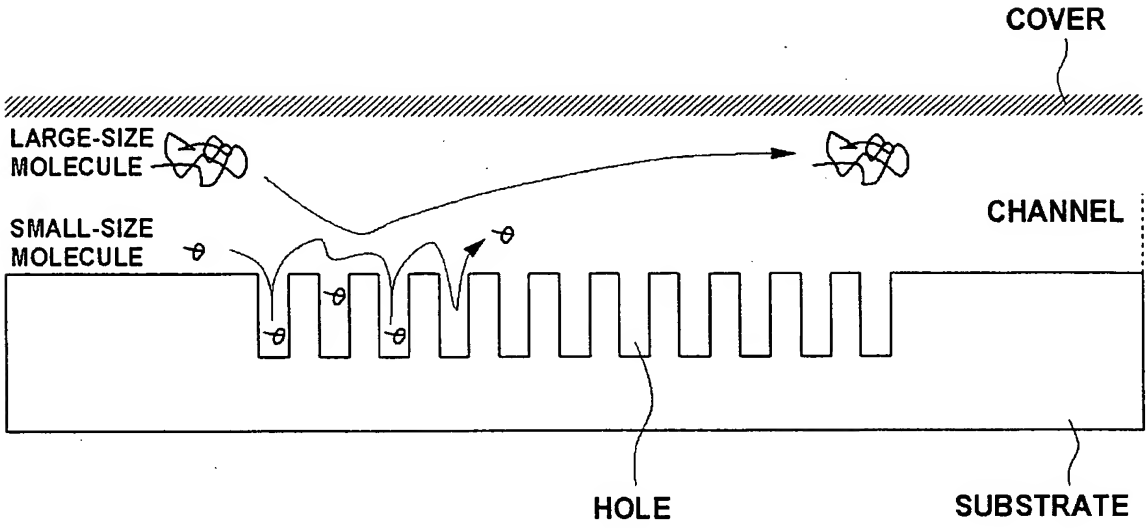

COVER
LARGE-SIZE MOLECULE
SMALL-SIZE MOLECULE
CHANNEL
HOLE
SUBSTRATE

Fig.46

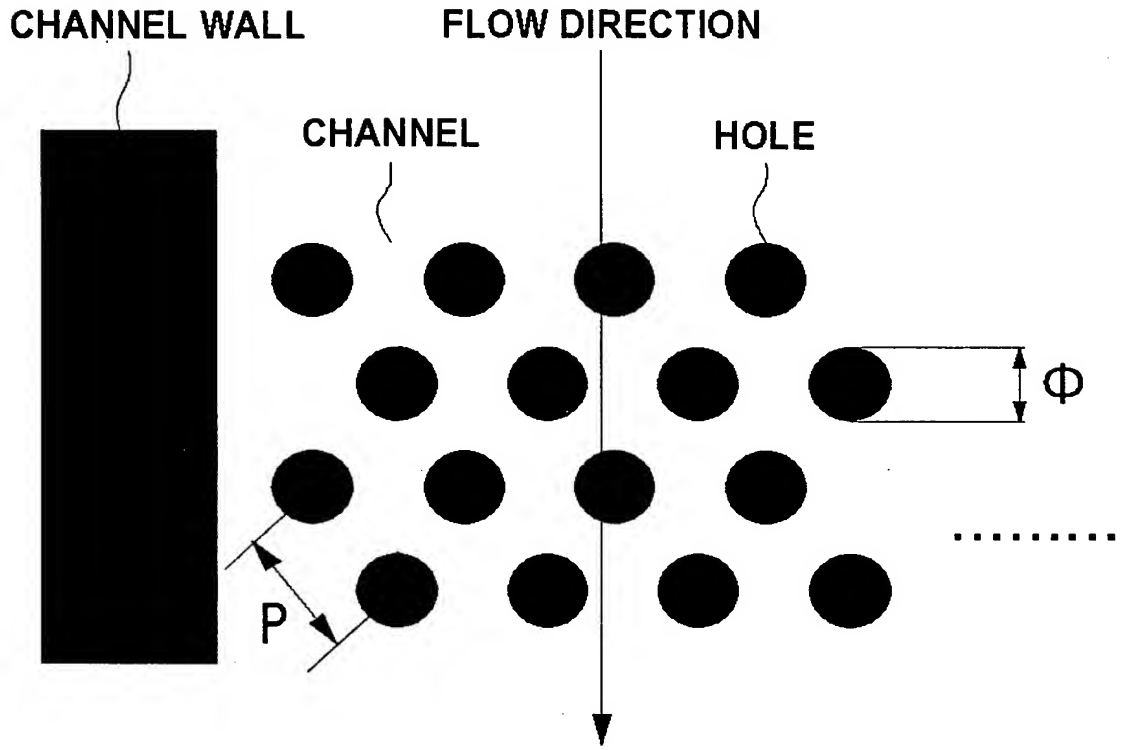


Fig.47

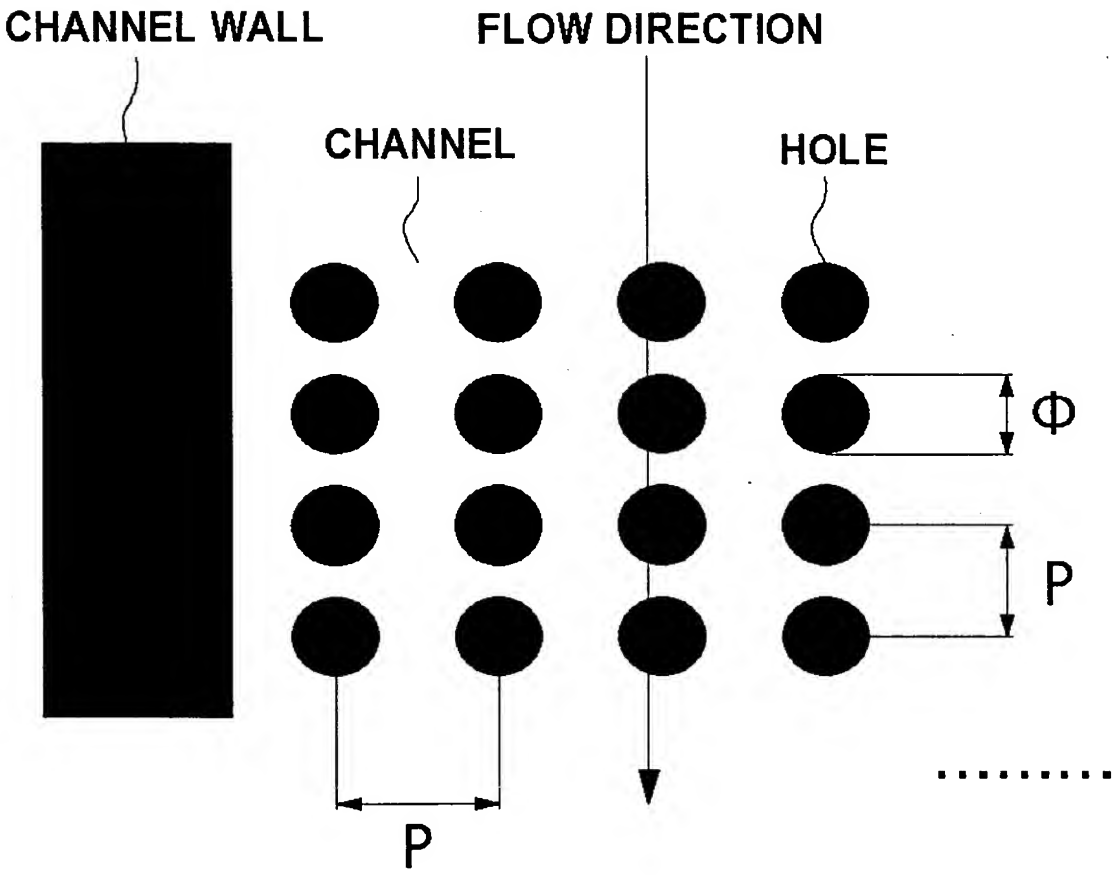


Fig.48

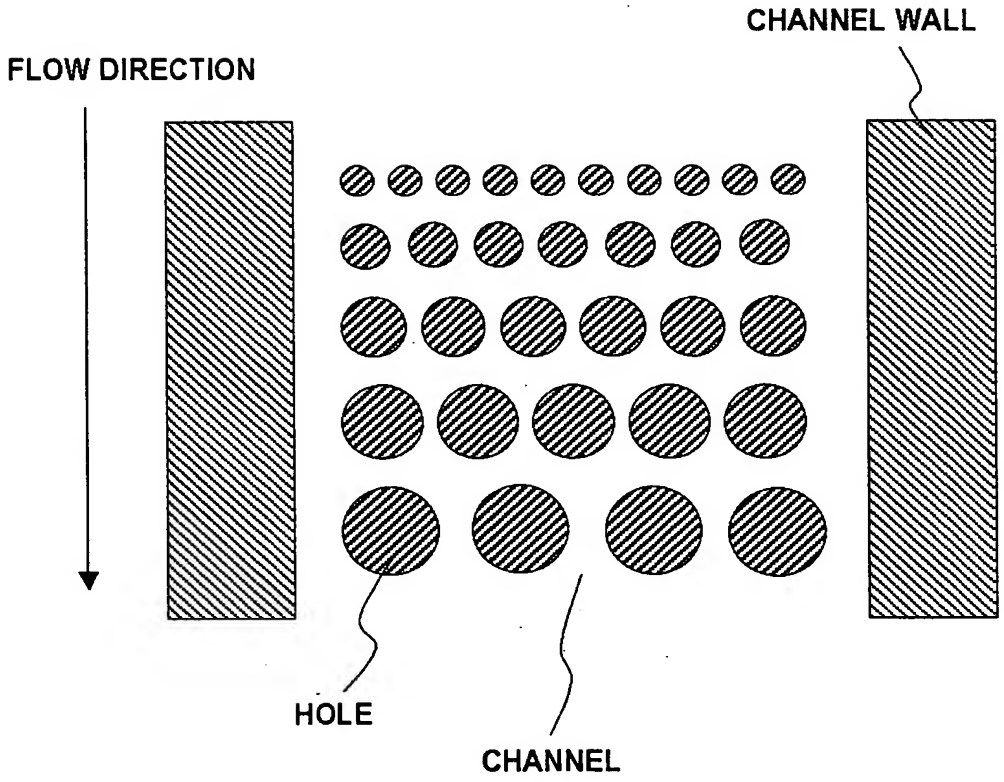


Fig.49

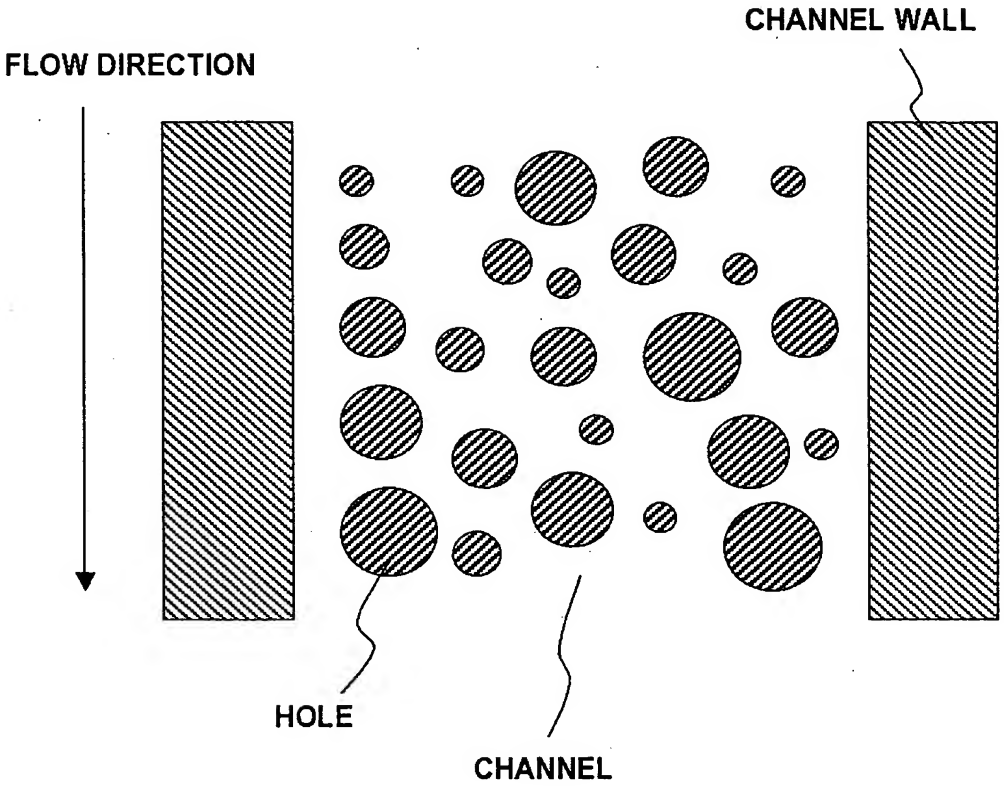


Fig.50

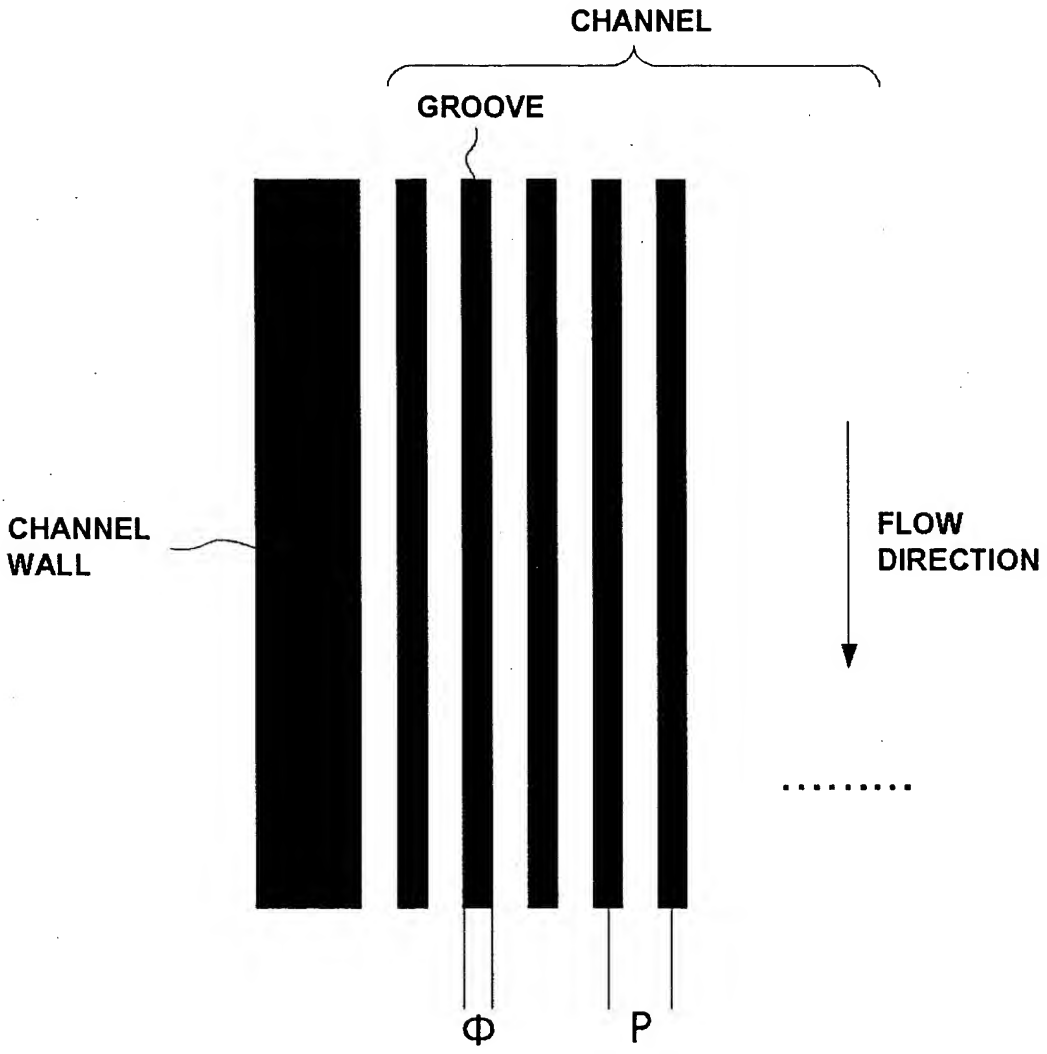


Fig.51

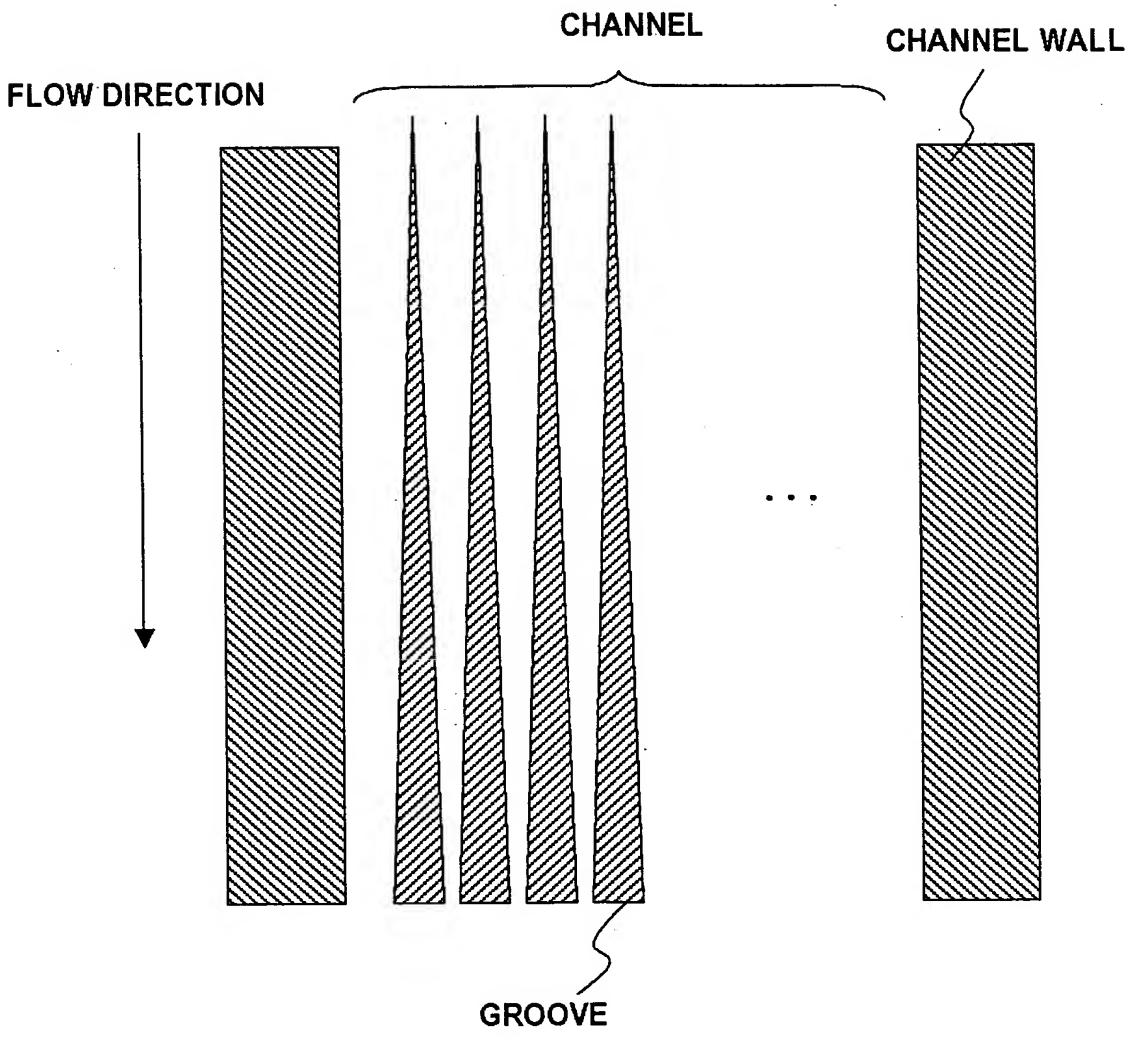


Fig.52

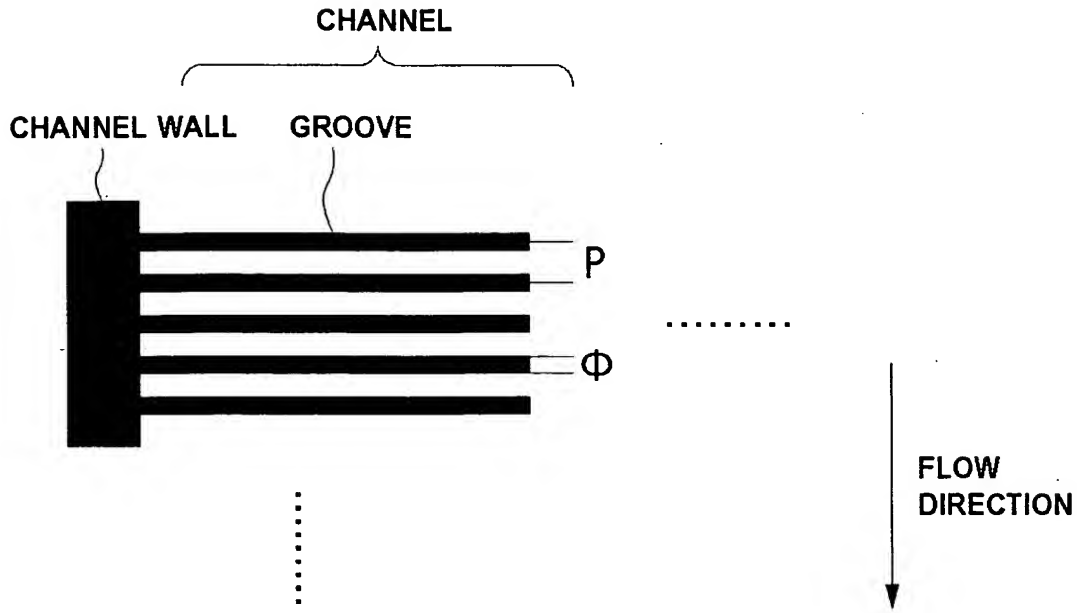
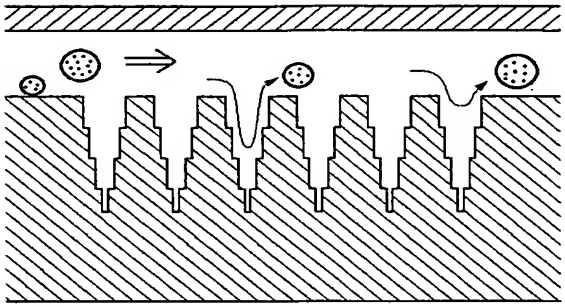
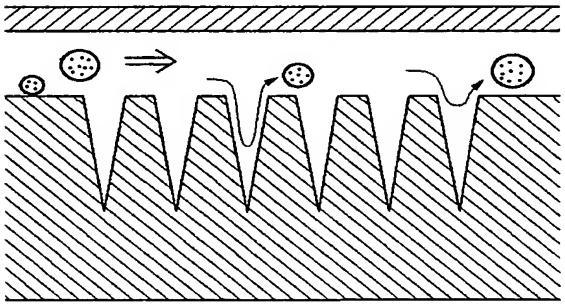


Fig.53

(a)



(b)



(c)

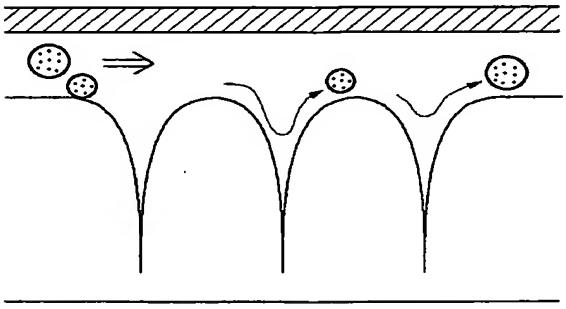
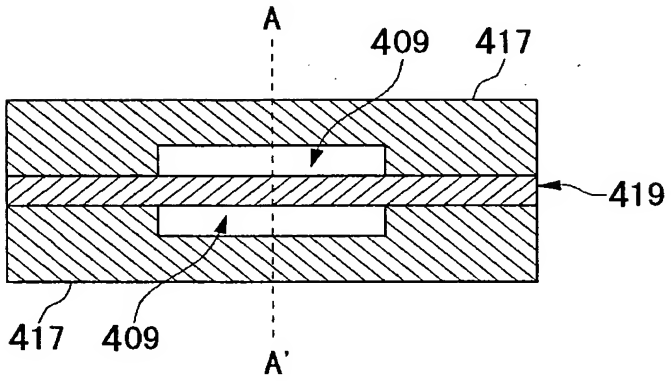
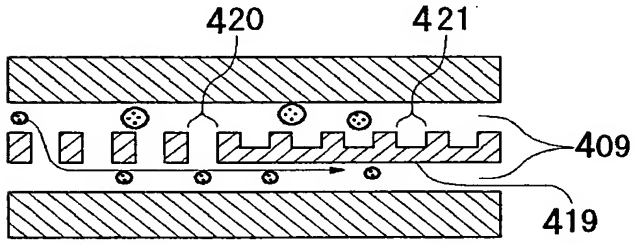


Fig.54

(a)



(b)



(c)

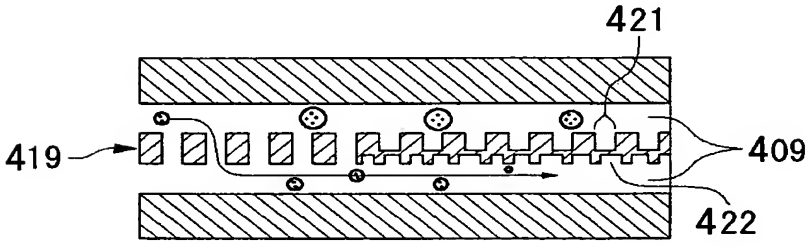
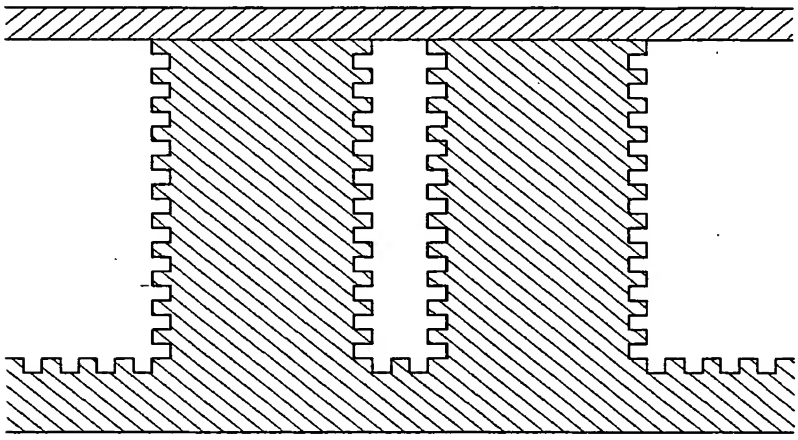


Fig.55

(a)



(b)

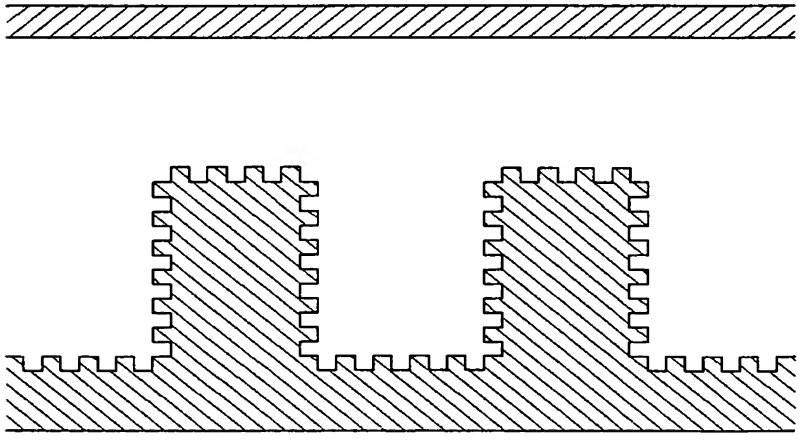


Fig.56

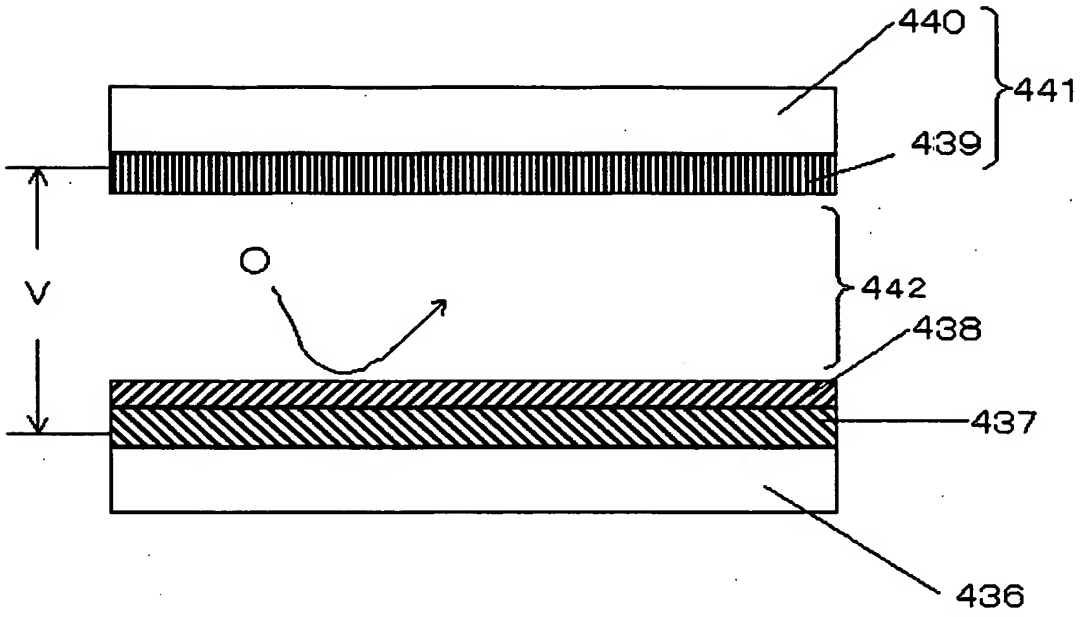


Fig.57

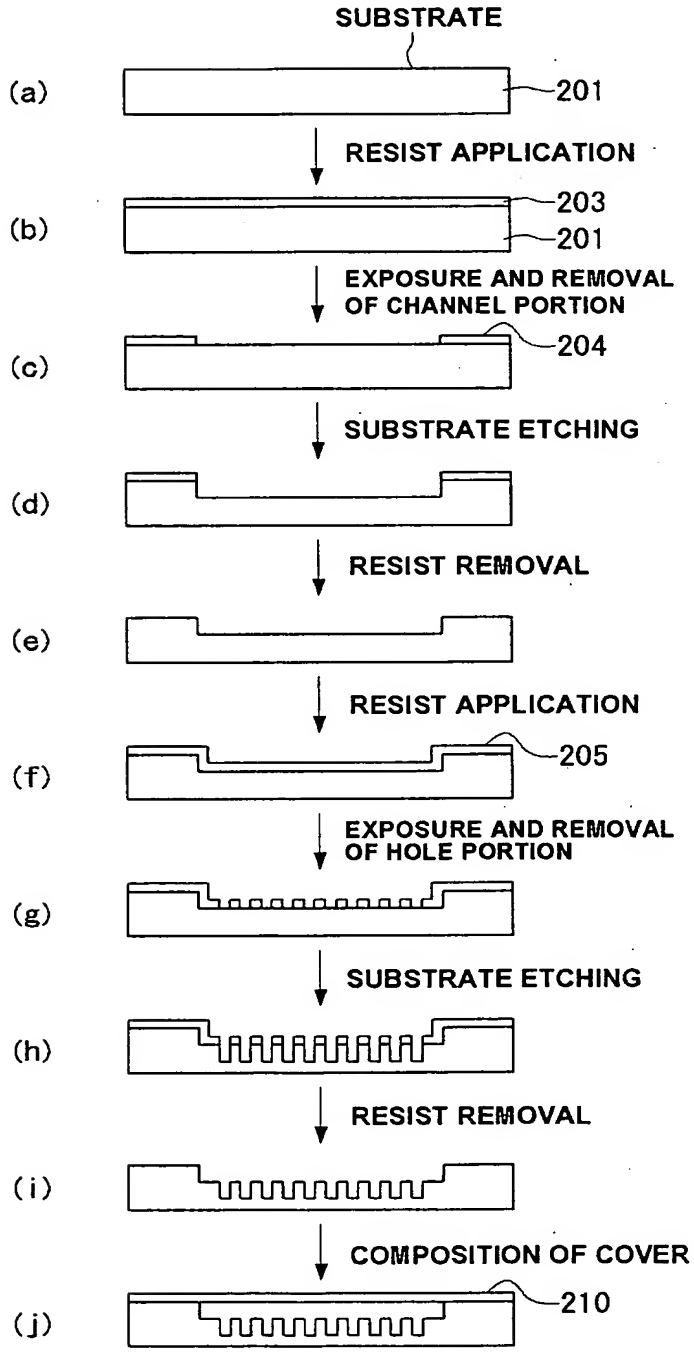

SUBSTRATE
(a)
201
RESIST APPLICATION
(b)
203
201
EXPOSURE AND REMOVAL OF CHANNEL PORTION
(c)
204
SUBSTRATE ETCHING
(d)
RESIST REMOVAL
(e)
RESIST APPLICATION
(f)
205
EXPOSURE AND REMOVAL OF HOLE PORTION
(g)
SUBSTRATE ETCHING
(h)
RESIST REMOVAL
(i)
COMPOSITION OF COVER
(j)
210

Fig.58

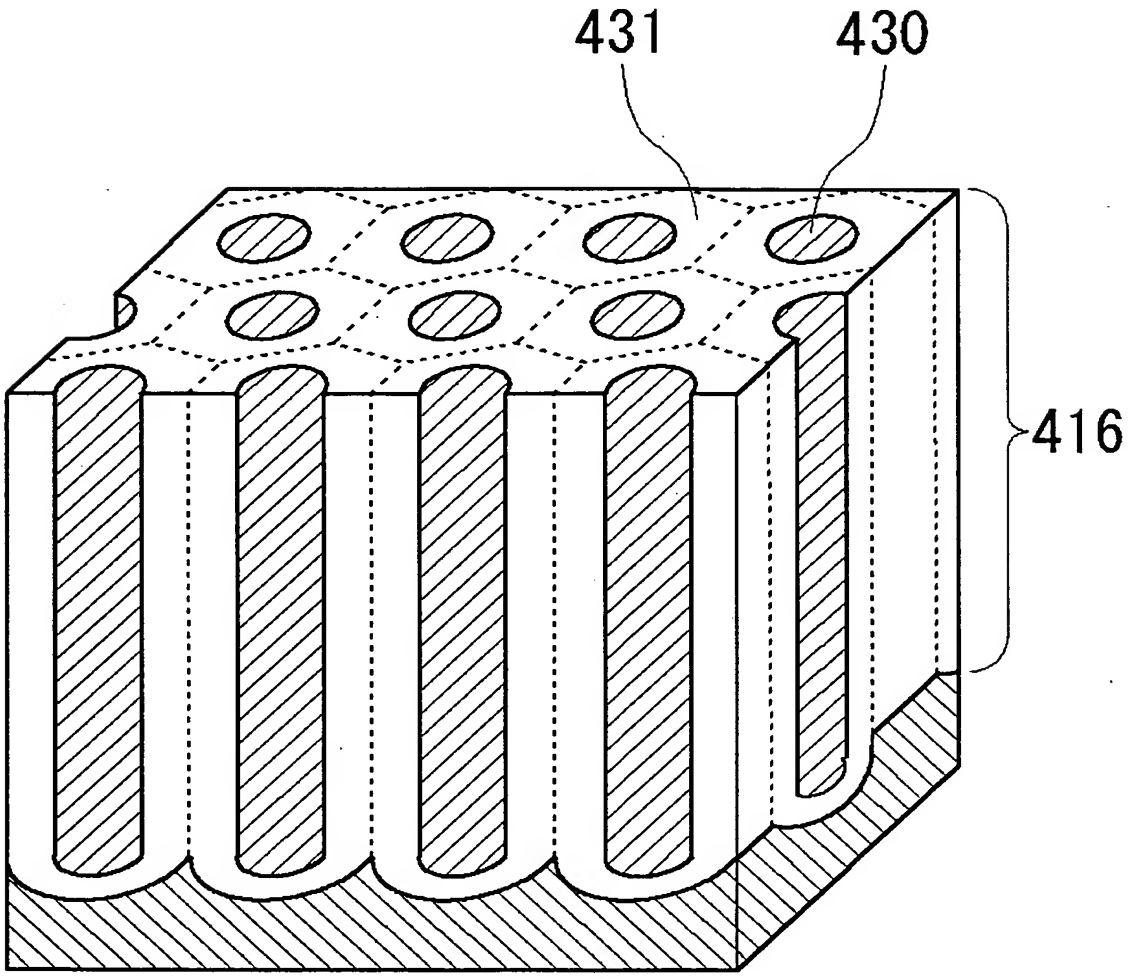


Fig.59

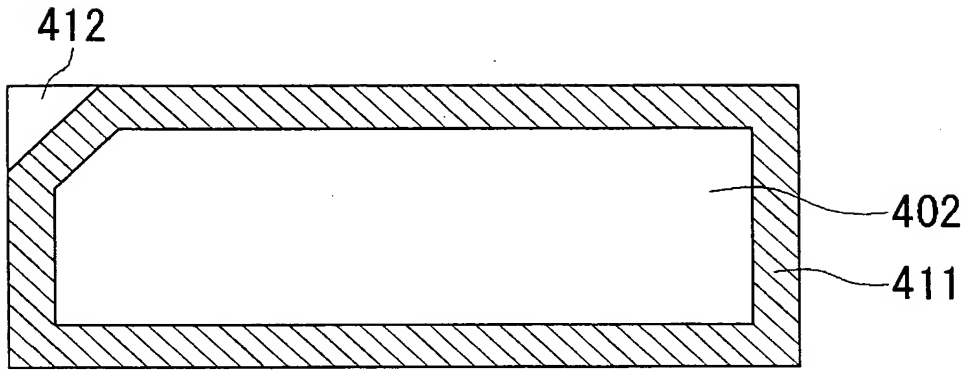


Fig.60

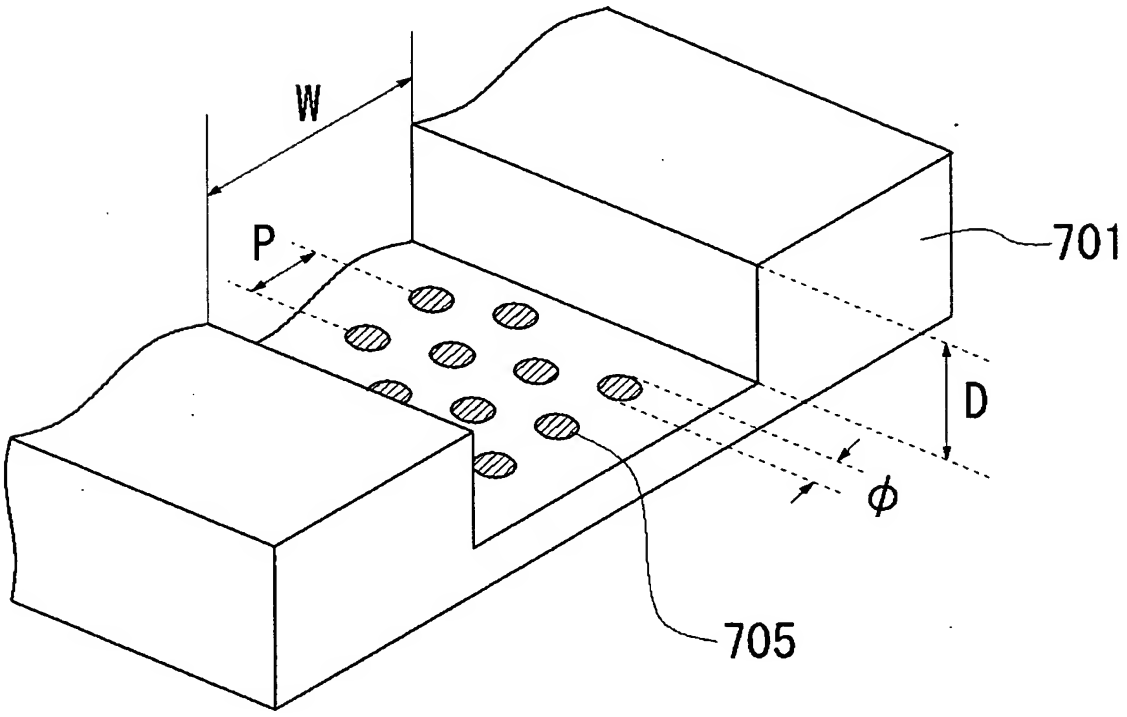
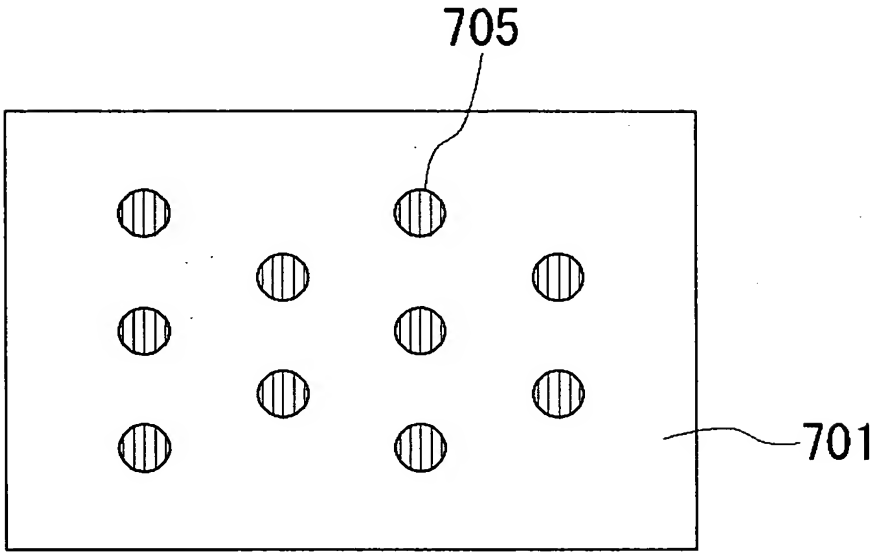


Fig.61

(a)



(b)

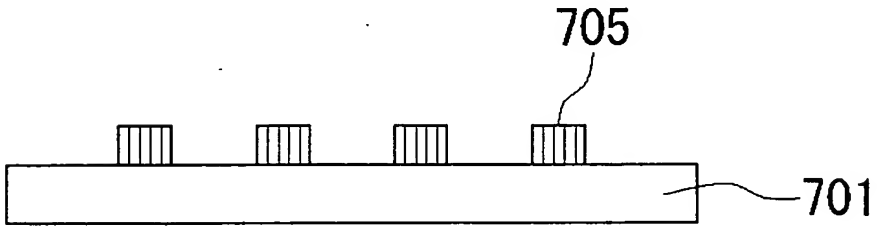


Fig.62

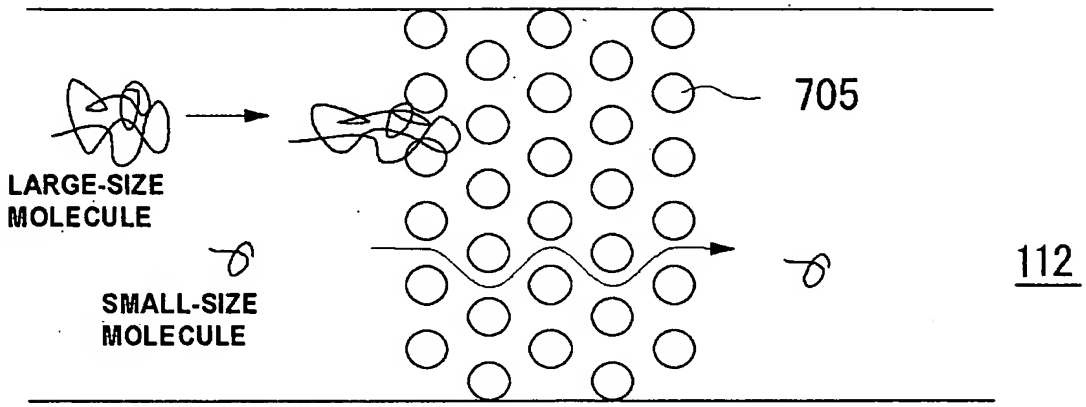


Fig.63

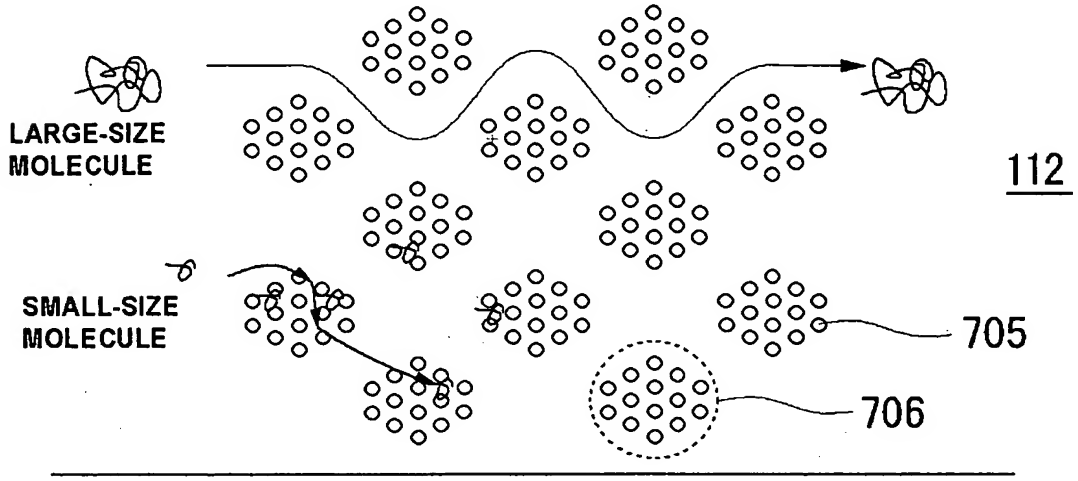
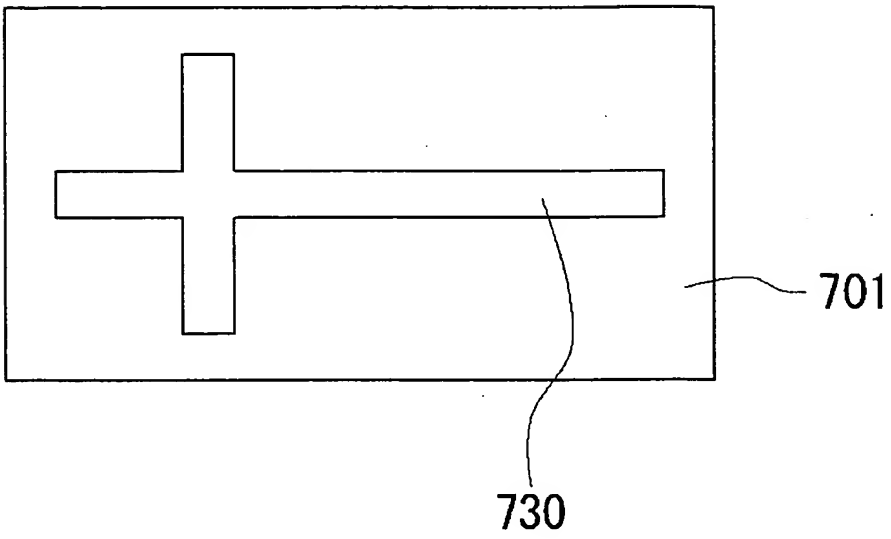


Fig.64

(a)



(b)

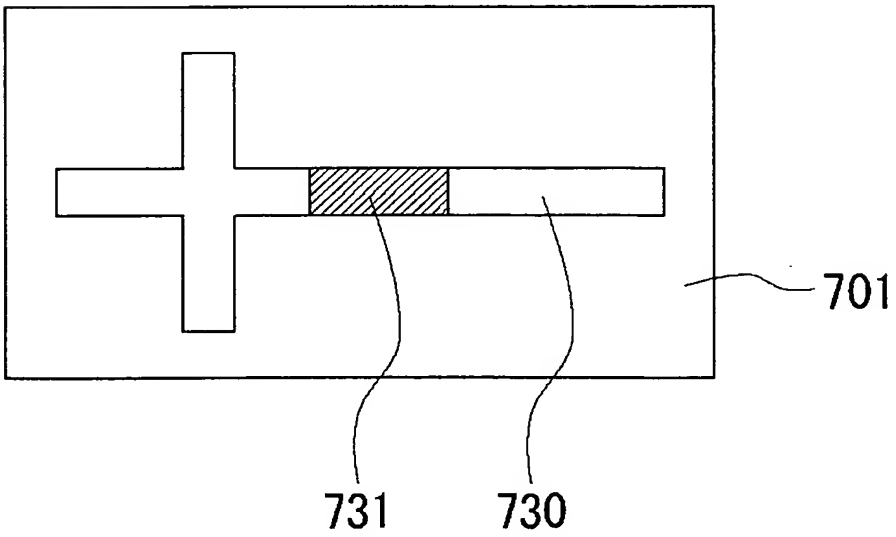


Fig.65

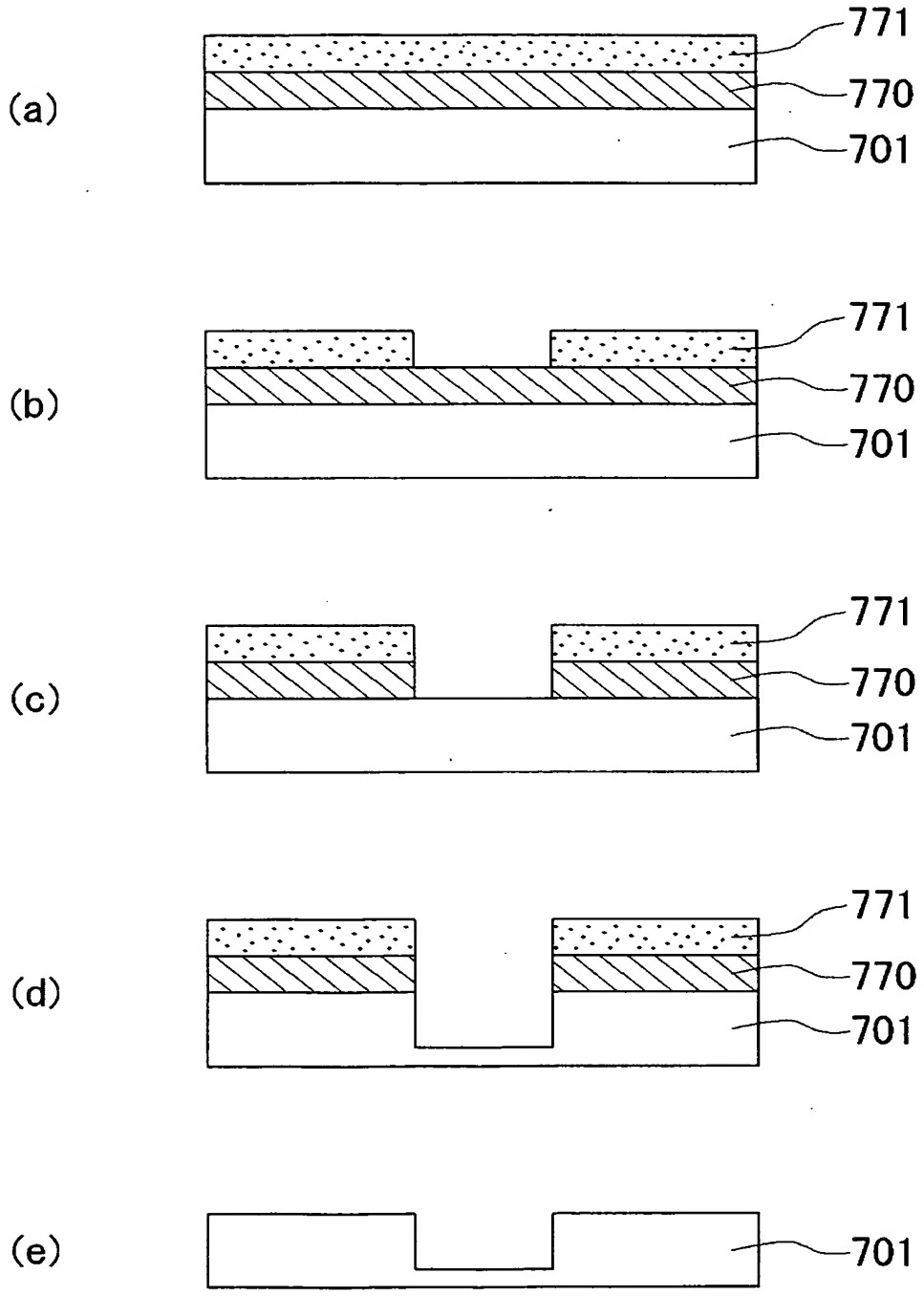


Fig.66

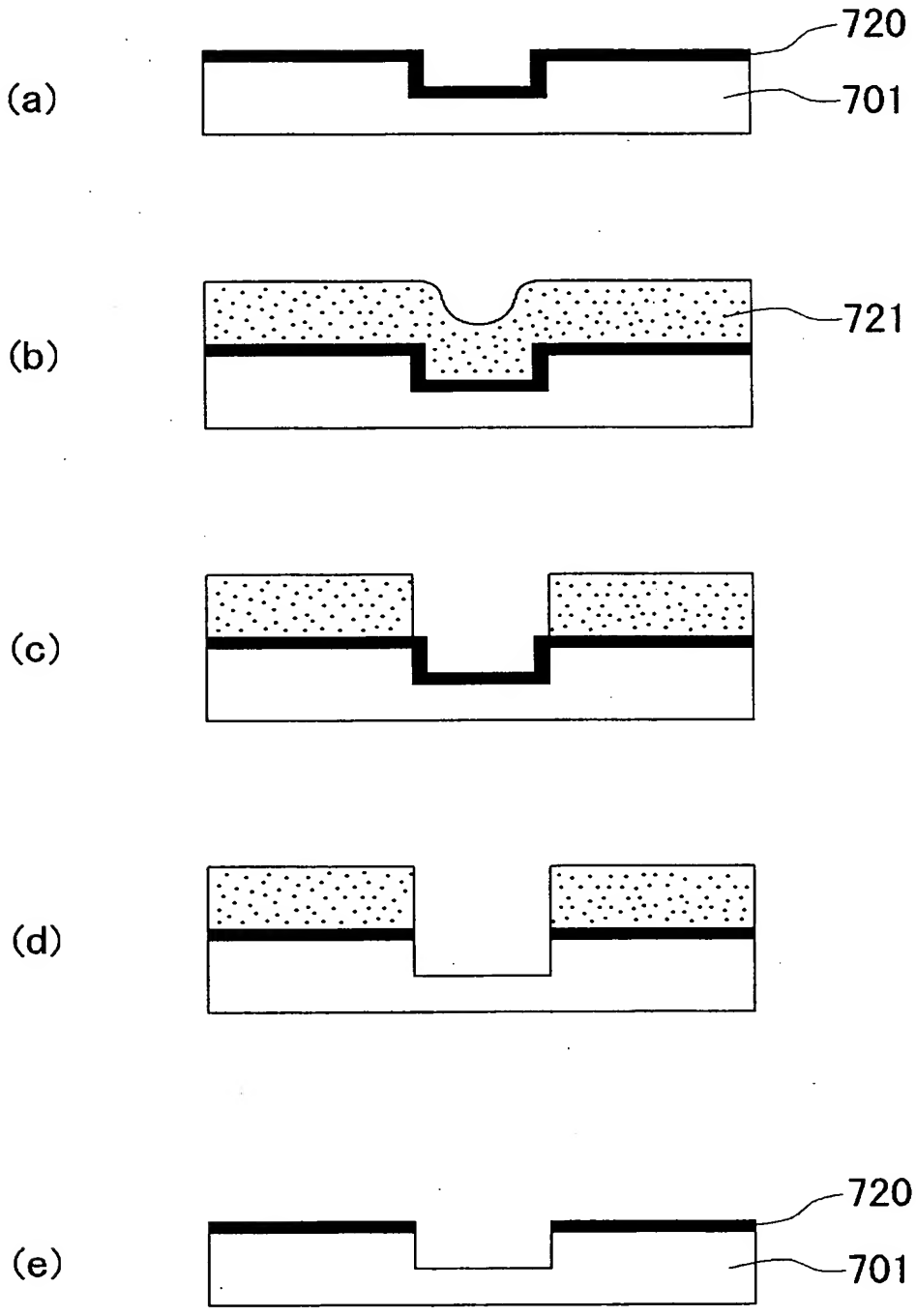
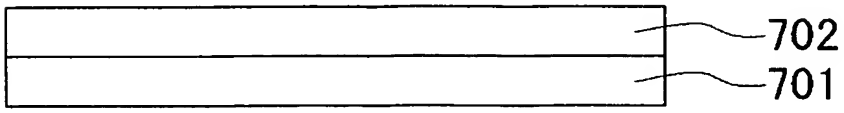
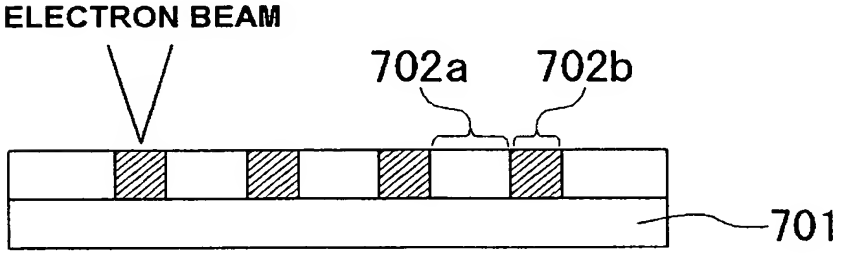


Fig.67

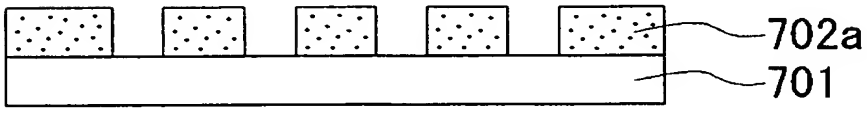
(a)


702
701

(b)


ELECTRON BEAM
702a
702b
701

(c)


702a
701

(d)

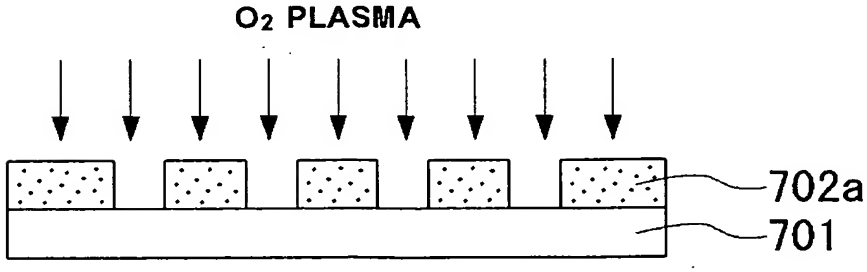

O2 PLASMA
702a
701

Fig.68

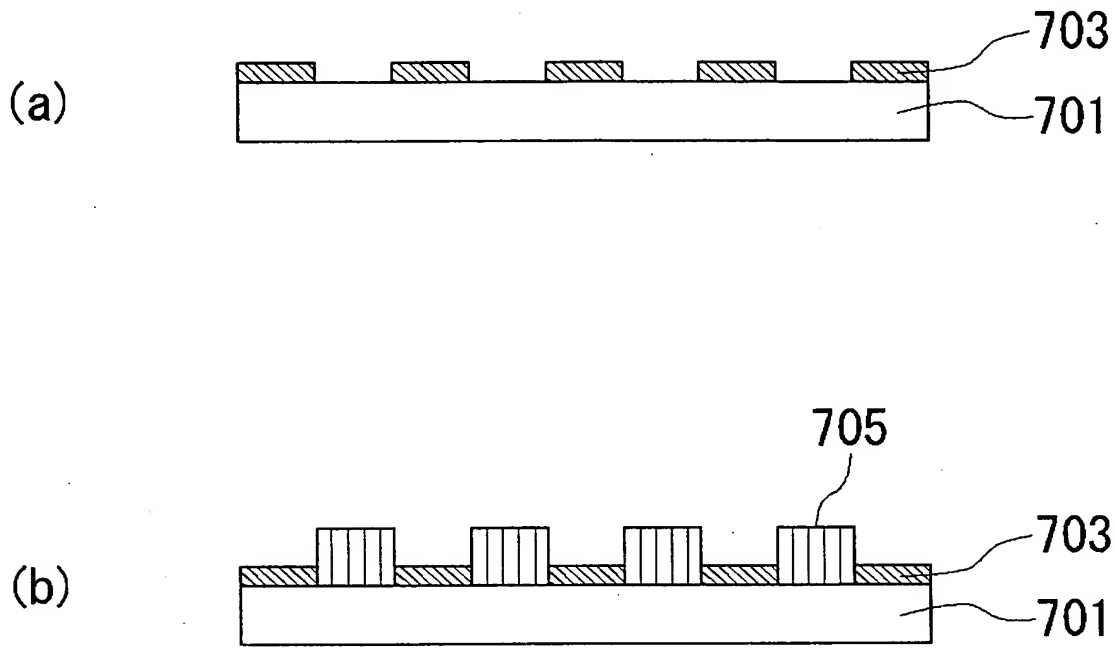
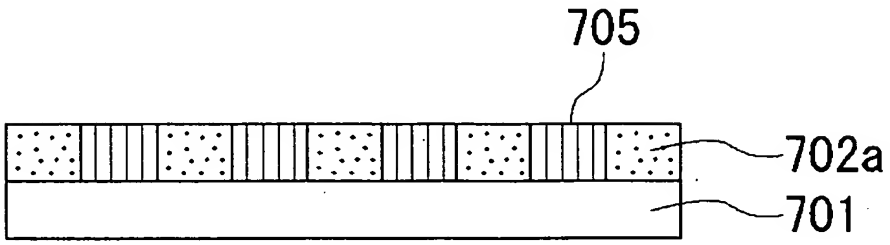


Fig.69

(a)



(b)

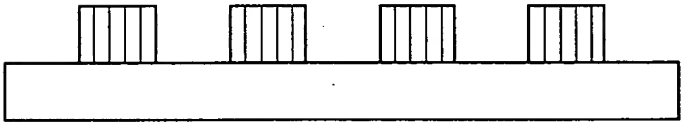


Fig.70

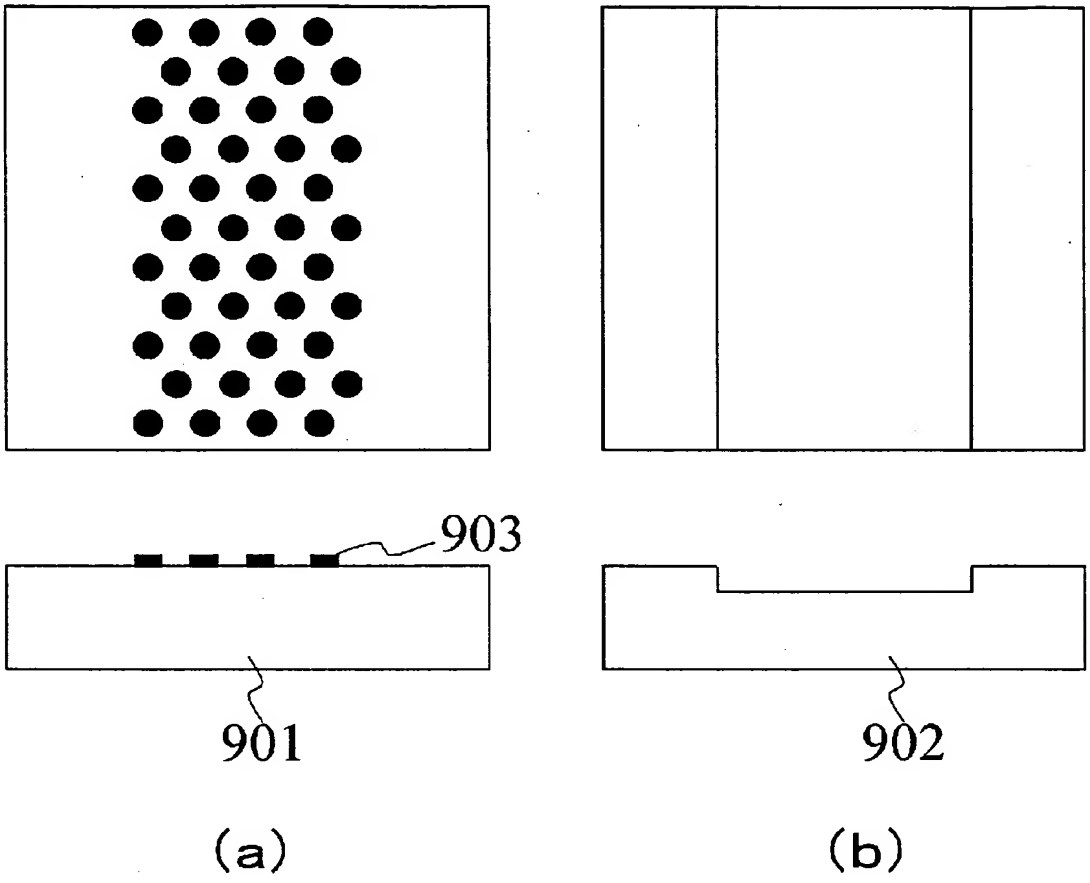


Fig.71

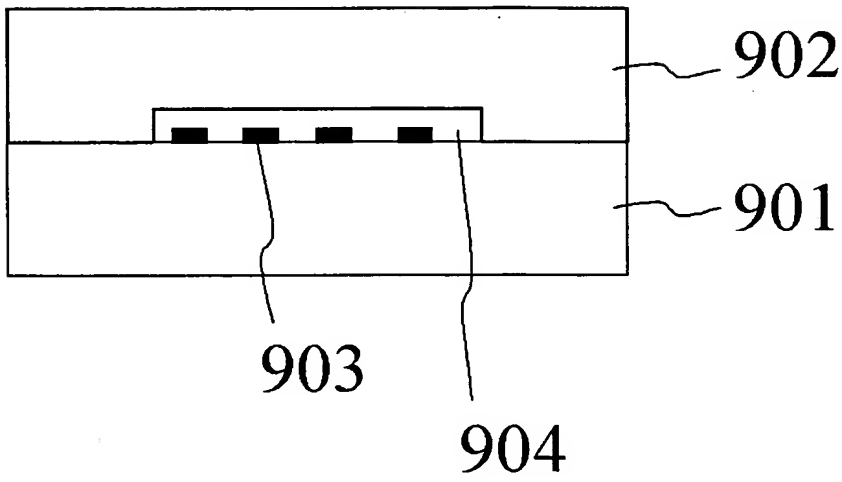


Fig.72

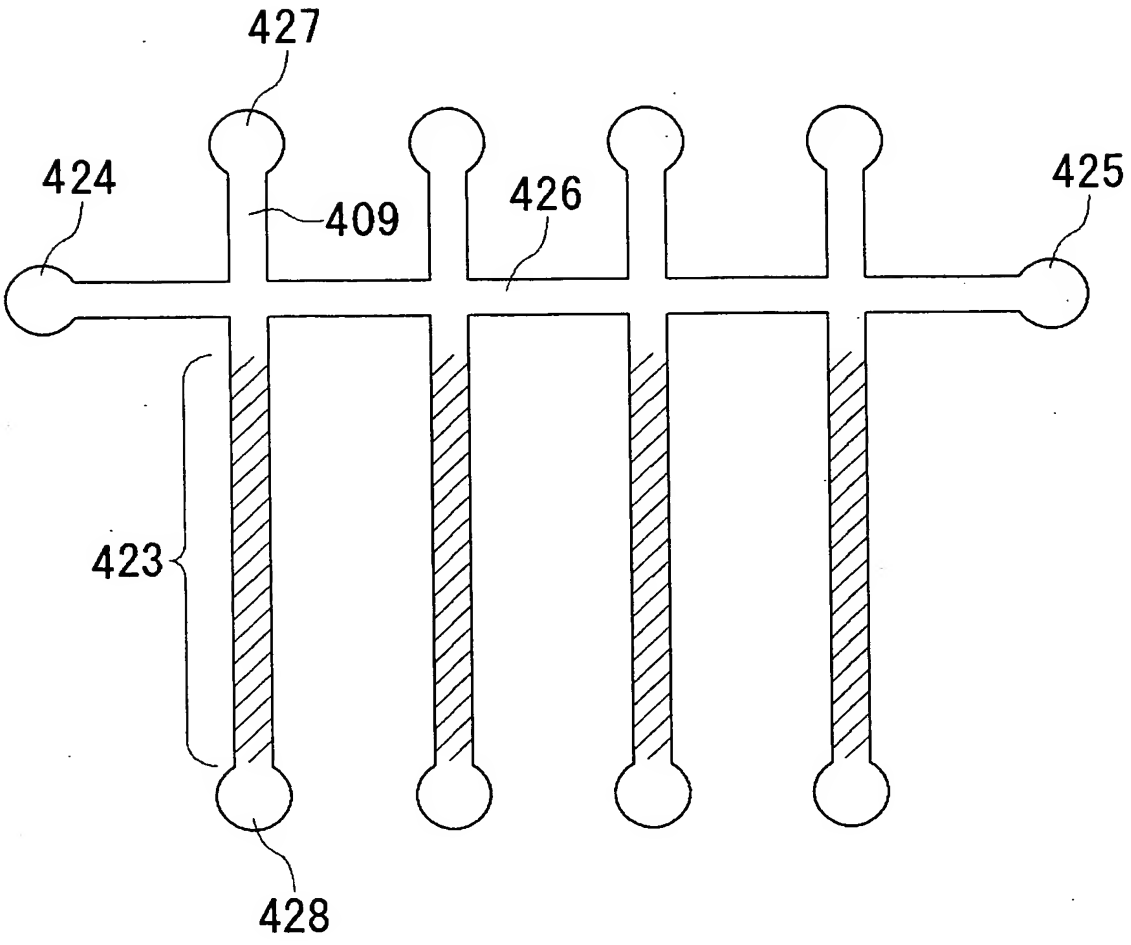


Fig.73

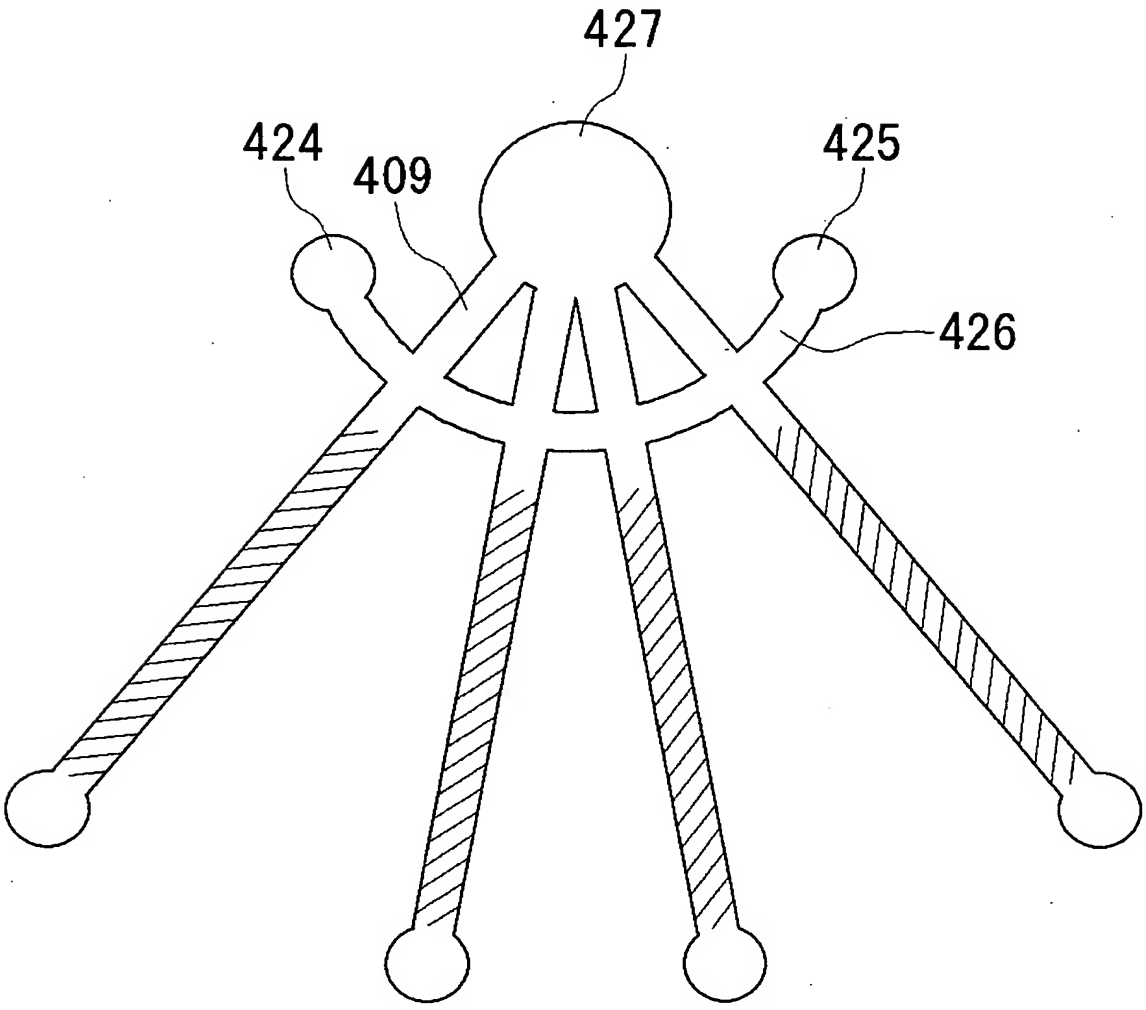


Fig.74

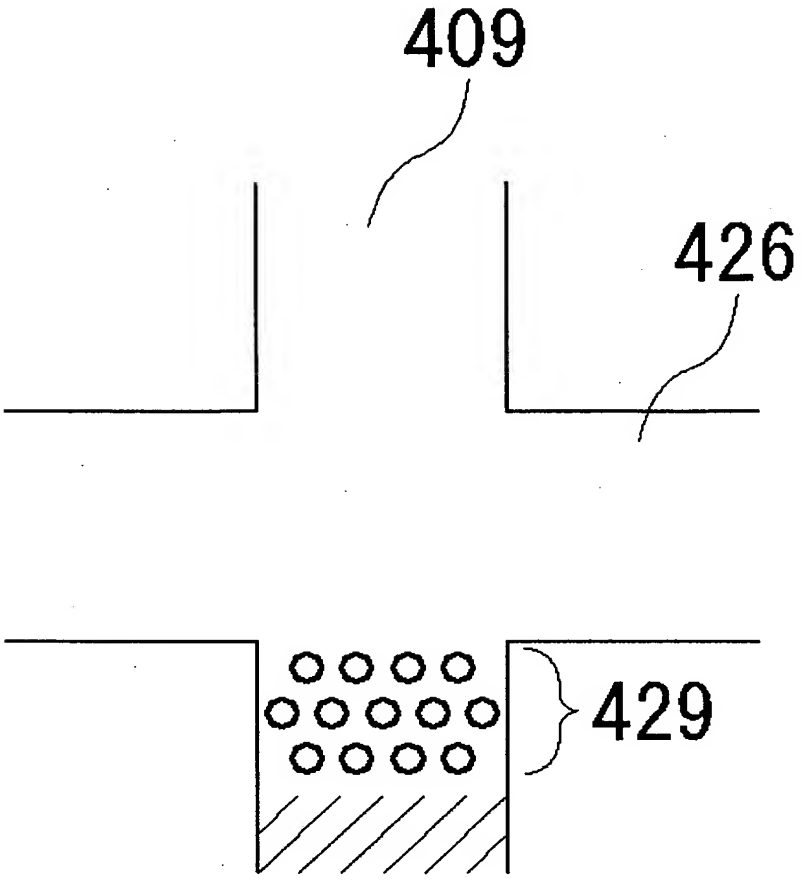
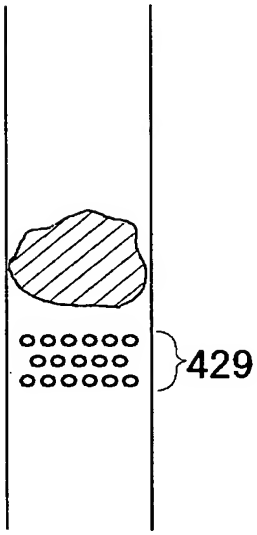


Fig.75

(a)



(b)

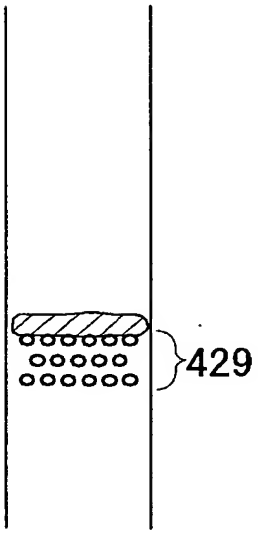
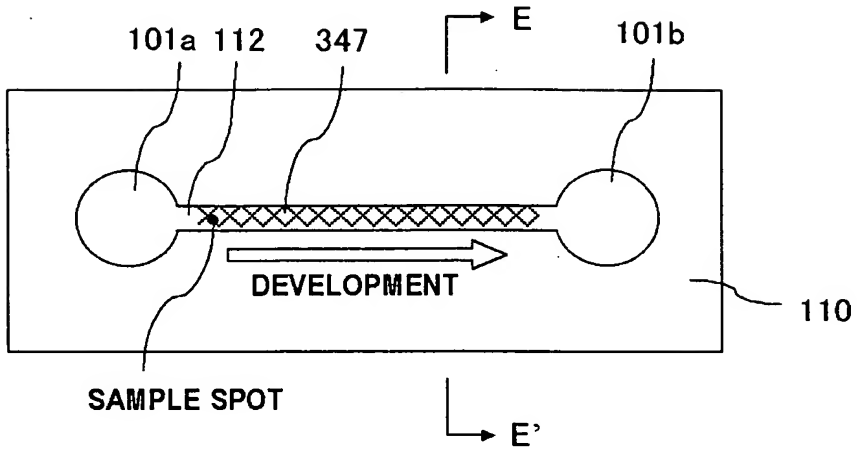


Fig.76

(a)



(b)

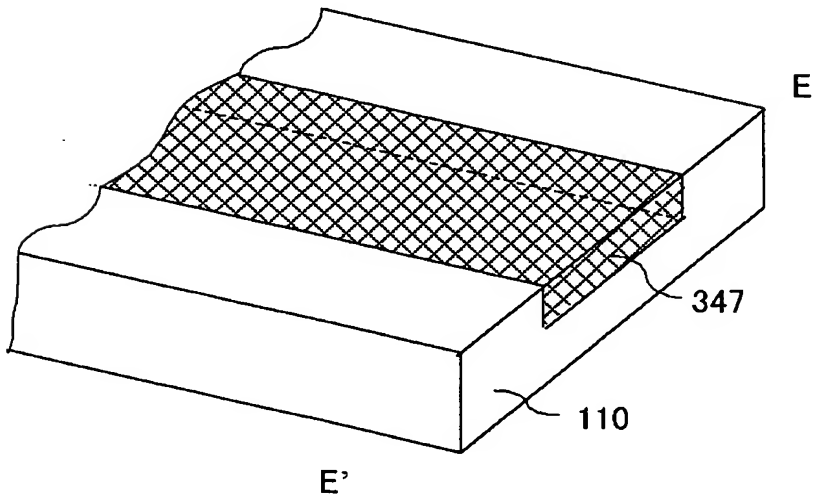


Fig.77

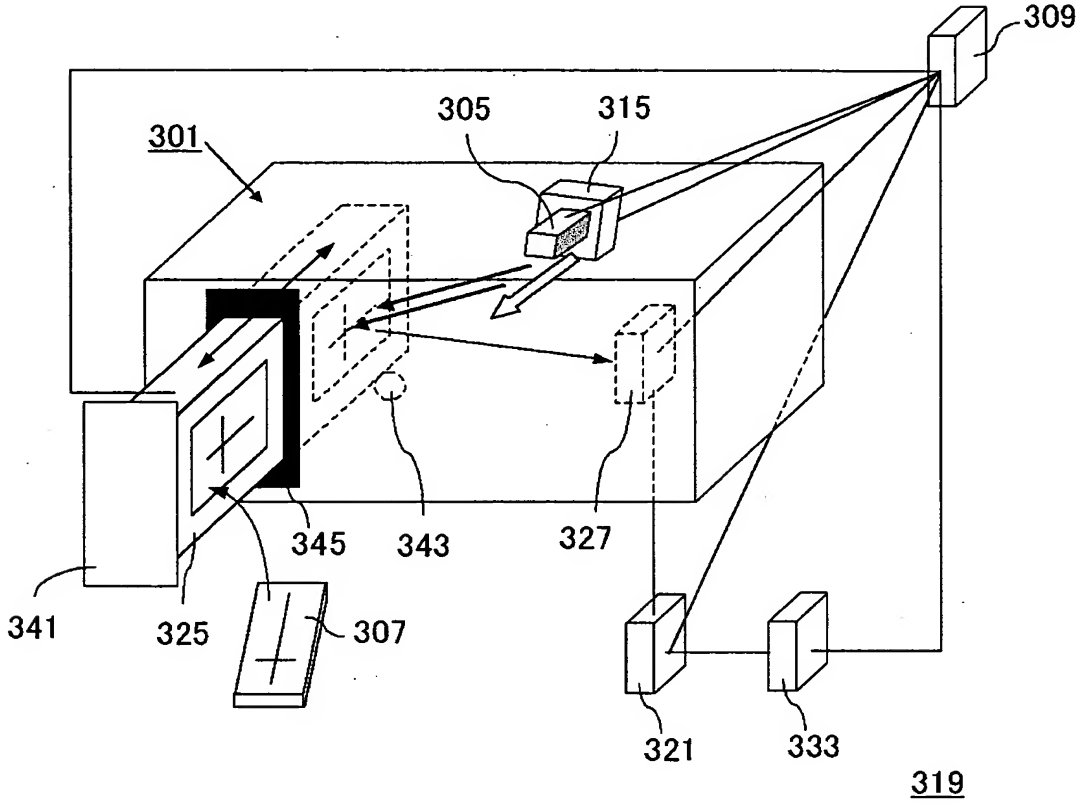


Fig.78

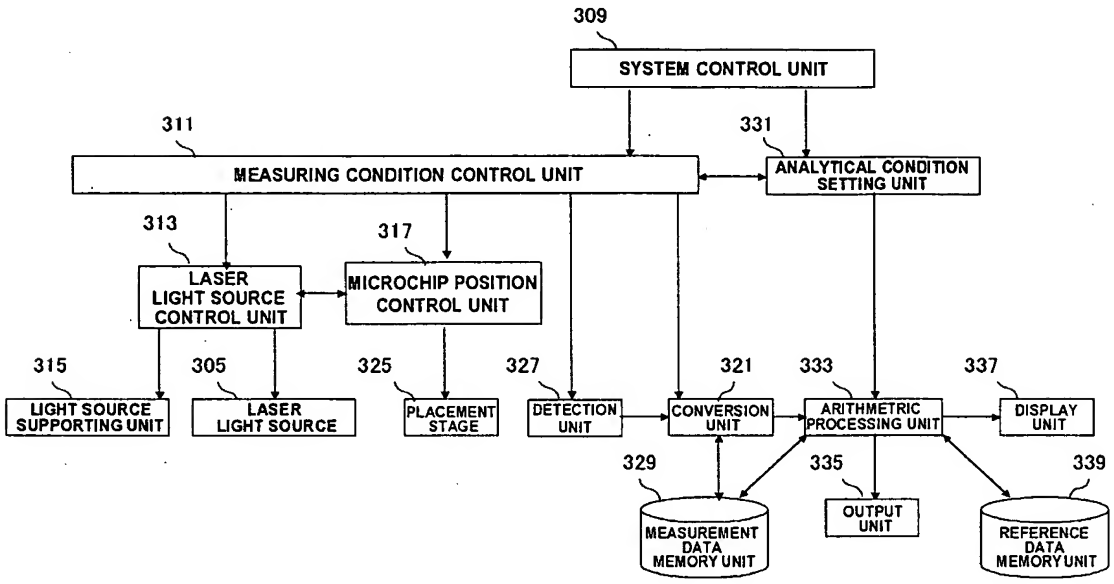


Fig.79

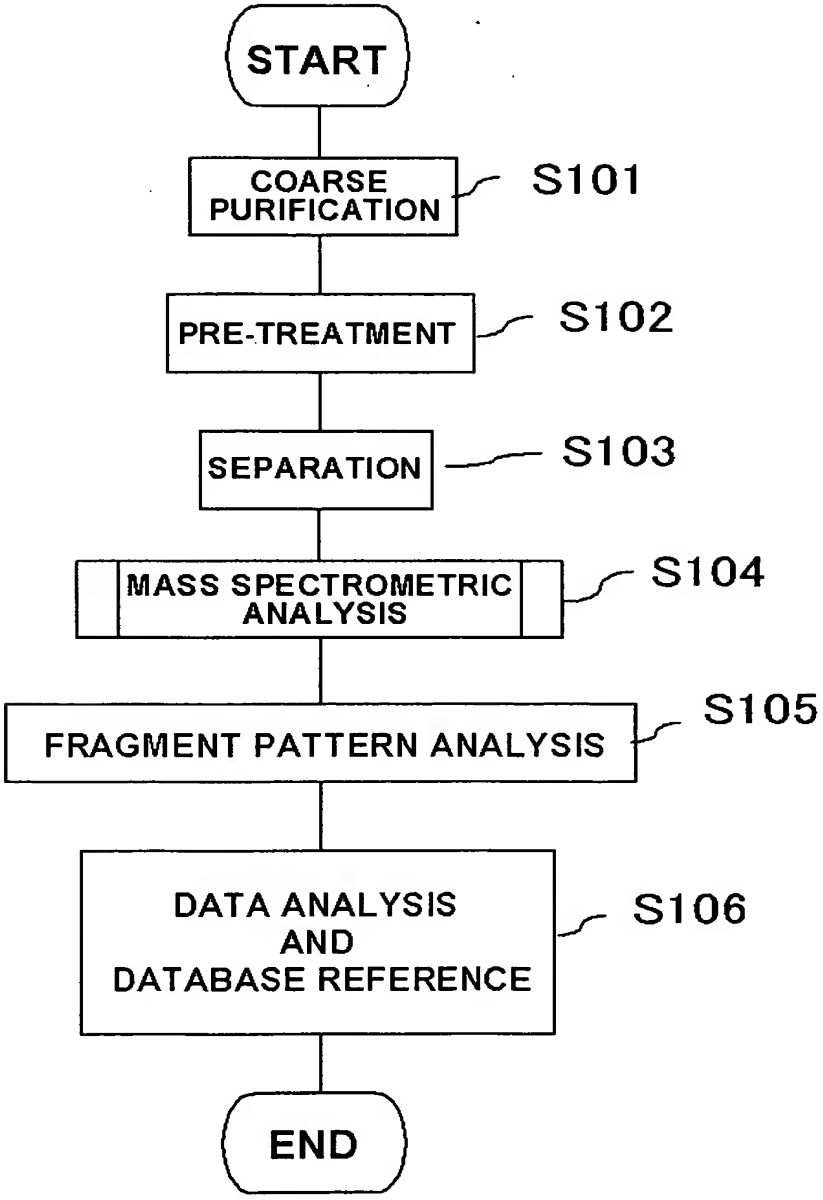


Fig.80

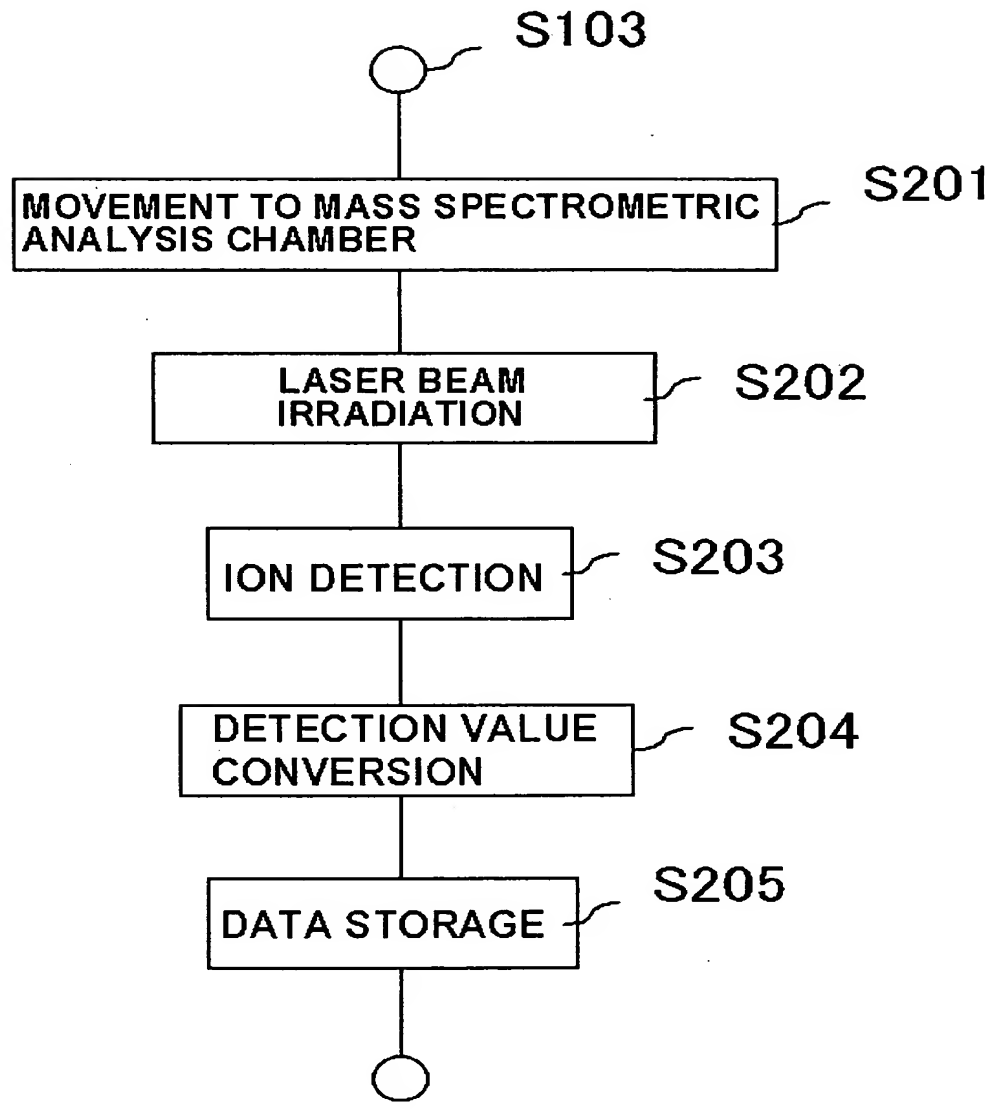

S103
MOVEMENT TO MASS SPECTROMETRIC ANALYSIS CHAMBER
S201
LASER BEAM IRRADIATION
S202
ION DETECTION
S203
DETECTION VALUE CONVERSION
S204
DATA STORAGE
S205
S104

Fig.81

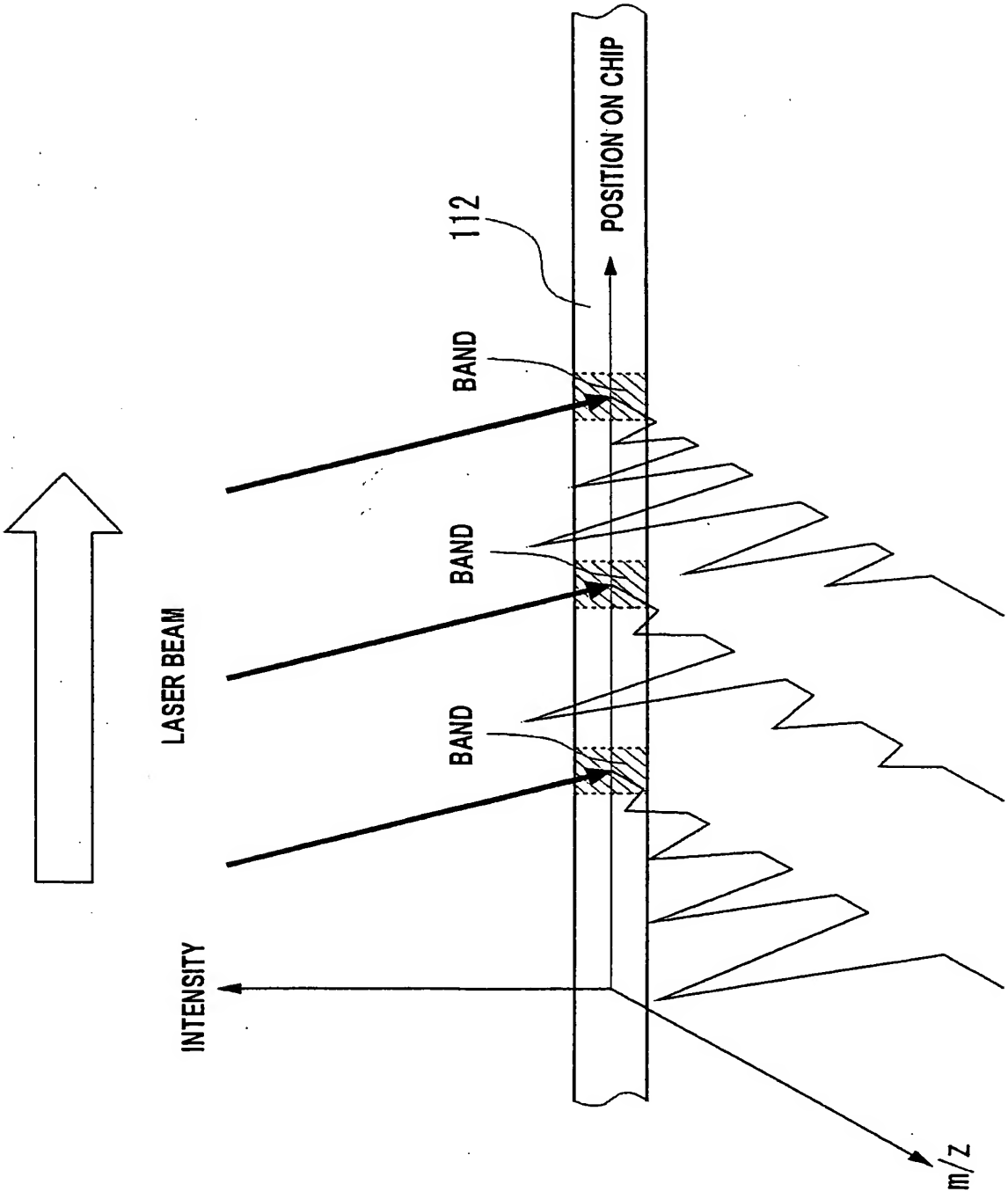


Fig.82

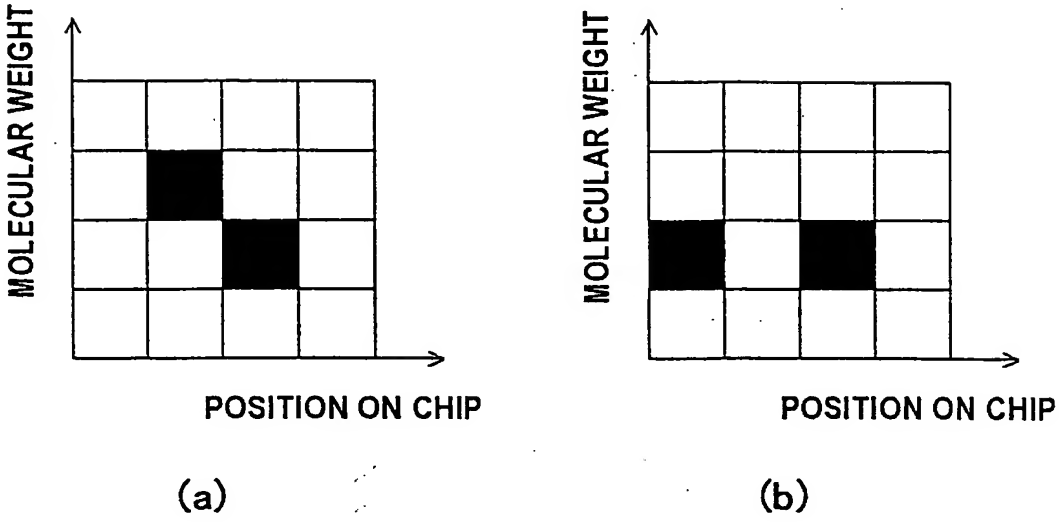

MOLECULAR WEIGHT
POSITION ON CHIP
(a)
MOLECULAR WEIGHT
POSITION ON CHIP
(b)

Fig.83

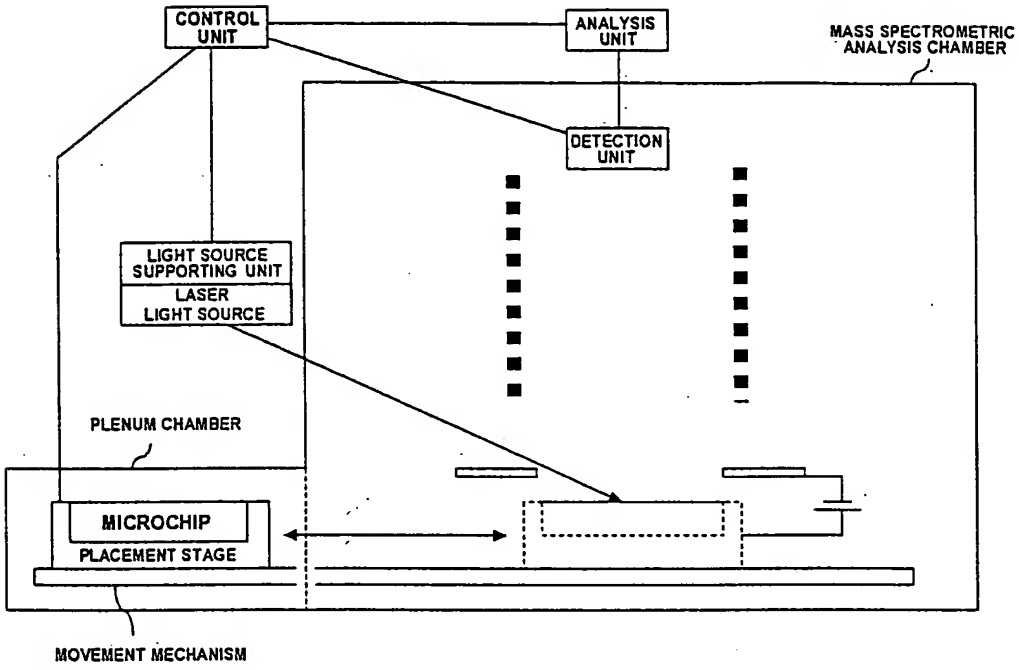
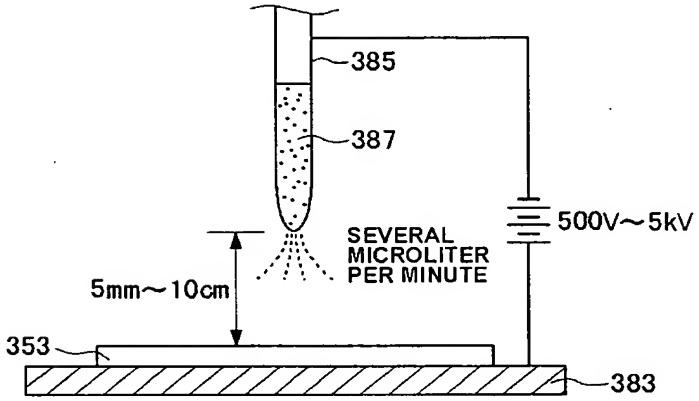
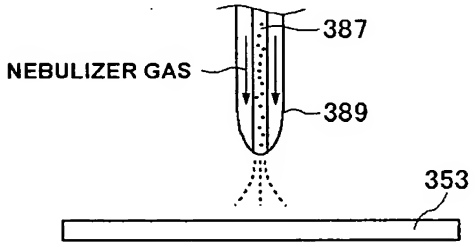

CONTROL UNIT
ANALYSIS UNIT
MASS SPECTROMETRIC ANALYSIS CHAMBER
DETECTION UNIT
LIGHT SOURCE SUPPORTING UNIT
LASER LIGHT SOURCE
PLENUM CHAMBER
MICROCHIP
PLACEMENT STAGE
MOVEMENT MECHANISM

Fig.84

(a)



(b)



(c)

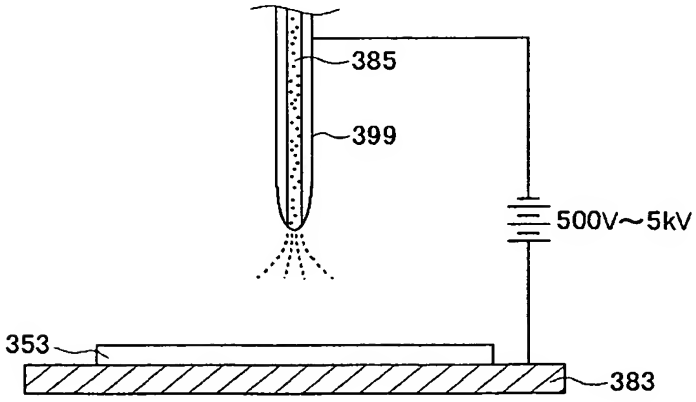
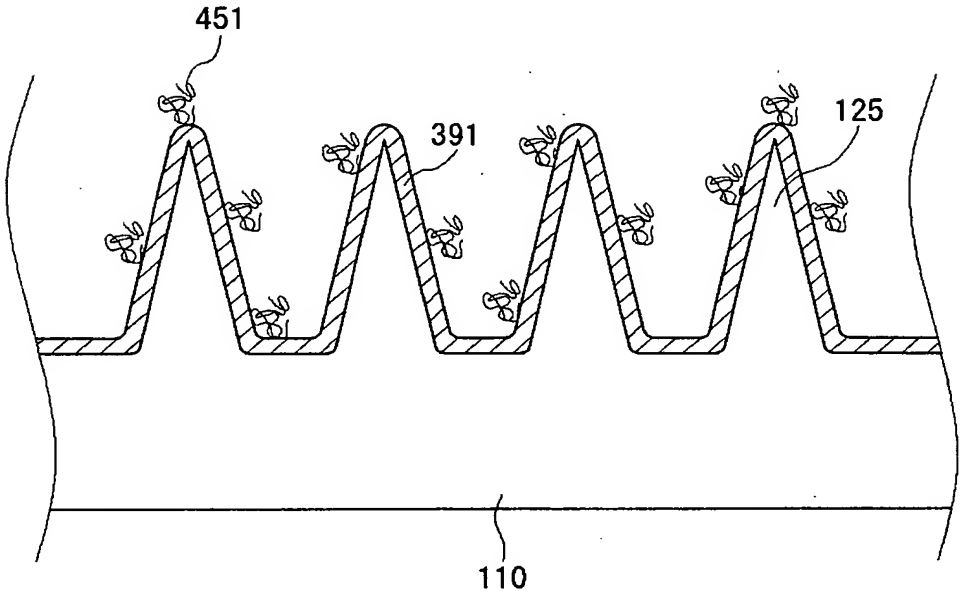


Fig.85

(a)



(b)

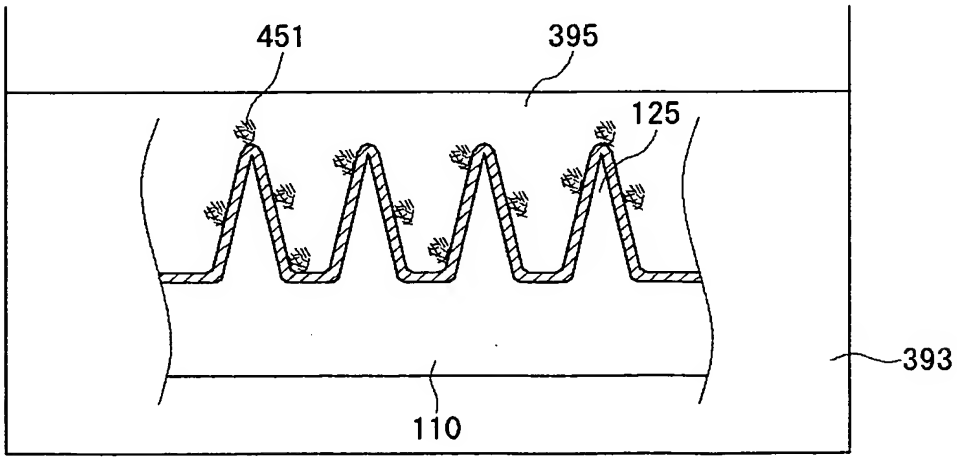
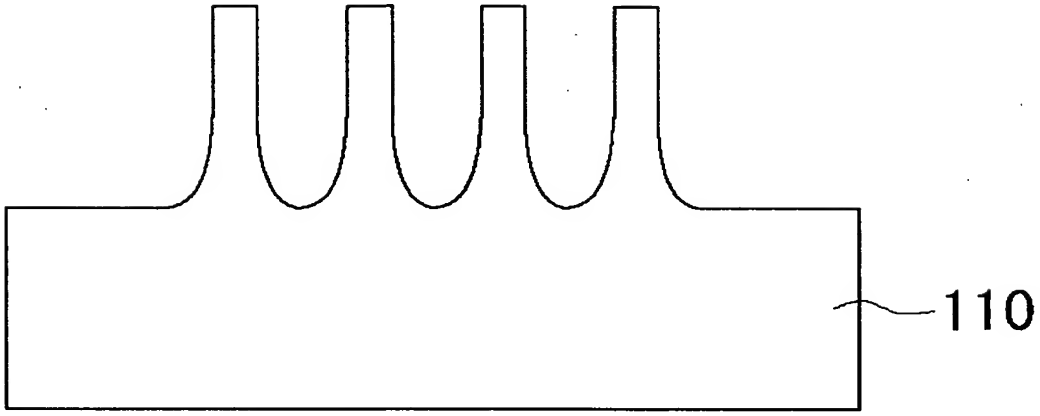


Fig.86

(a)



(b)

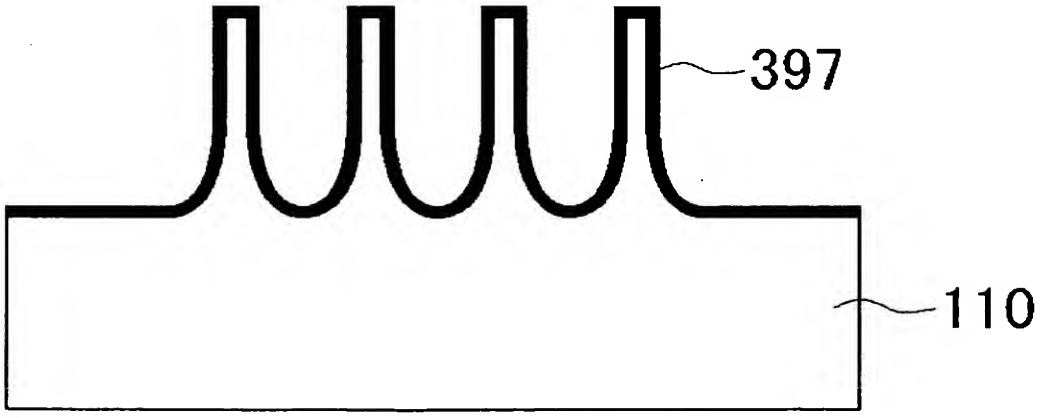
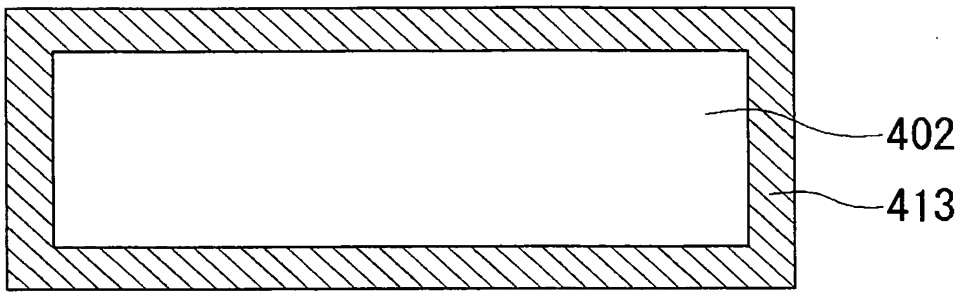


Fig.87

(a)



(b)